MECCANO® Magazine

DECEMBER 1971

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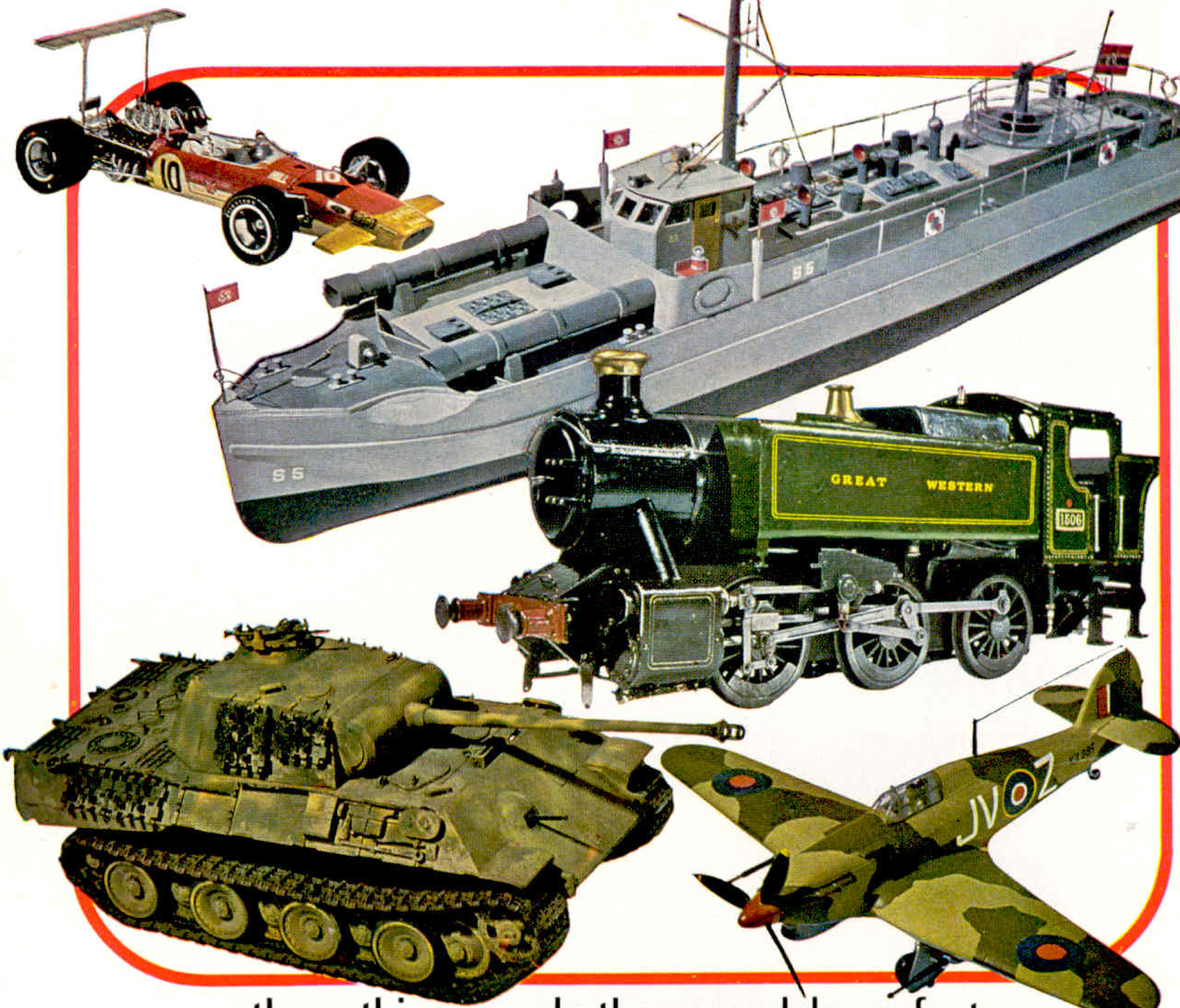

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MECCANO® Magazine

DECEMBER 1971 VOLUME 56 NUMBER 12

Meccano Magazine, founded 1916

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MAP **HOBBY MAGAZINE**

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FRONT COVER

A gay carnival float entered by the Liverpool factory in a local procession. Note that even Miss Meccano's throne is built in this remarkably versatile medium.

NEXT MONTH

Musical box history, full results of the Pocket Meccano Competition, and full-size plans for an indoor flying model.

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7 Bedford QL Portee and Fire; Albion BY1 General Service; A.E.C. 0854 Refueller; Ford F60L Armoured Lorry; Dennis Max Mk. 1 General Service; Morris CS8 Office; Dodge T215 Pick-up; Austin K3 General Service; Ford WOT.2H Office.

8 Austin K5 3-ton G.S. (UK); Diamond T 981 12-ton M.20 (USA); Dodge T 222 D 15-cwt G.S. (Can.); Leyland Retriever 3-ton Stores (UK); Albion FT 15 N Tractor field artillery (UK); Ford FT 15-cwt G.S. (Can.); Dodge Ambulance T214 ¾-ton (USA); Ford WOT 2H 15-cwt light warning (UK); Thornycroft Nubian TF/AC4/1 3-ton G.S. (UK).

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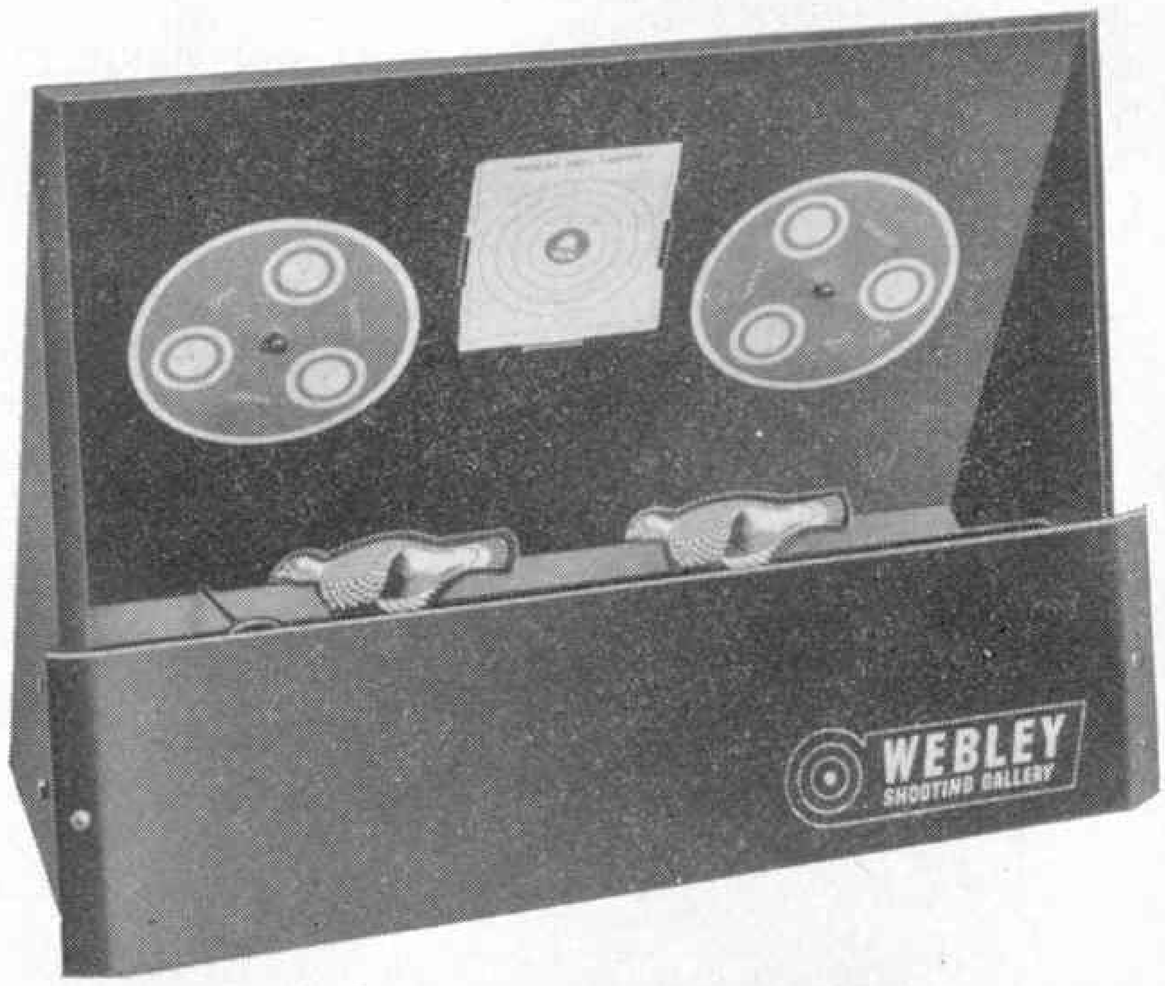

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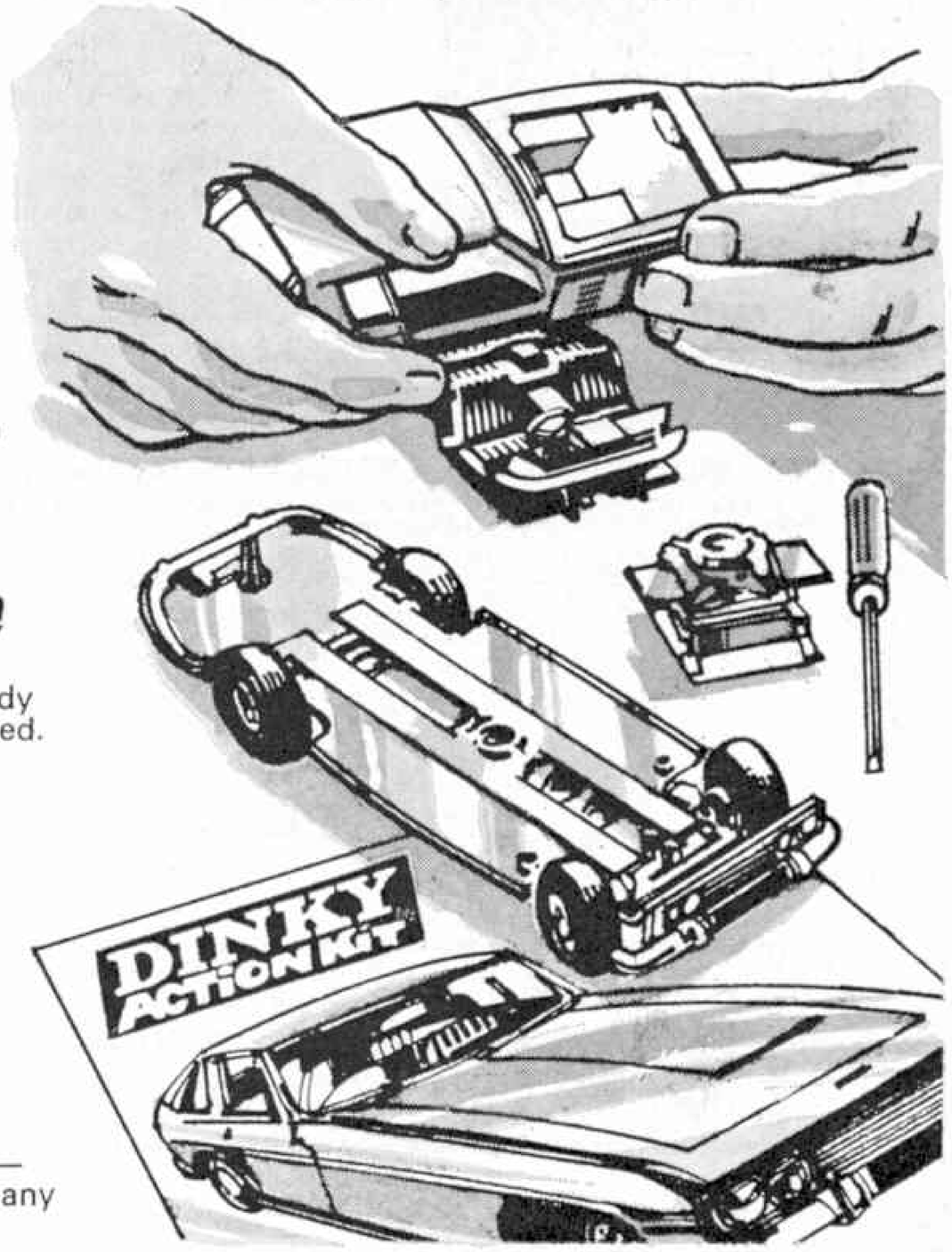

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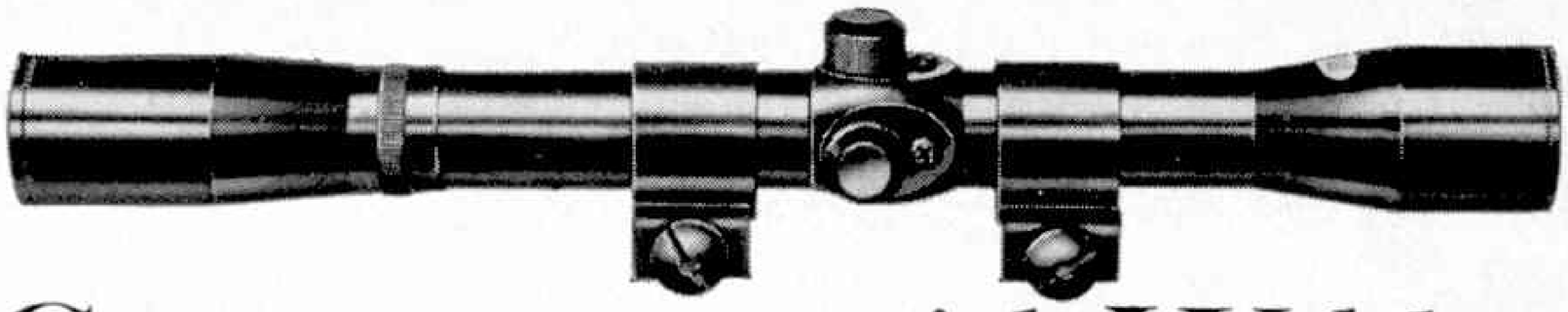

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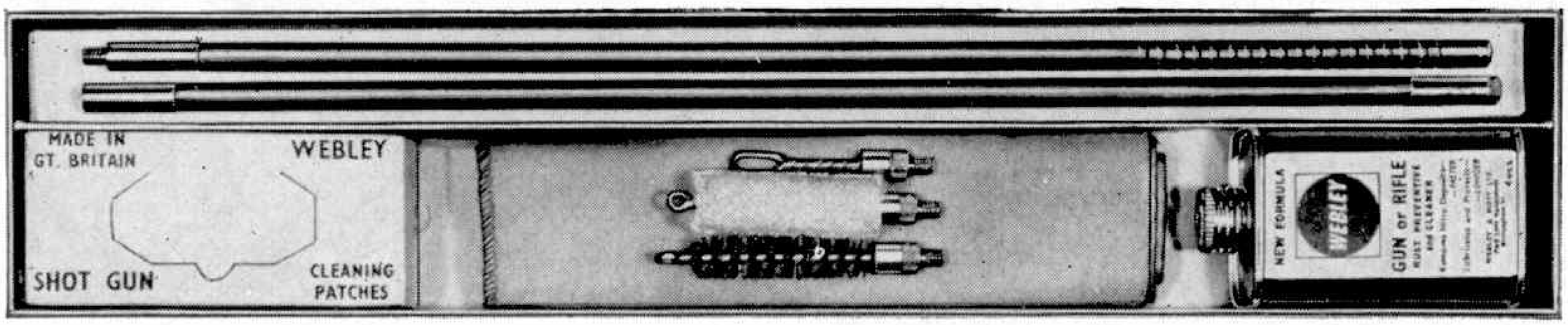

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MODEL ENGINEER EXHIBITION 1972

41st GREAT SHOW!

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(Not Sunday)

Model Aircraft, Locomotives Boats, Traction Engines Military Models, Crafts

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£300 in prizes . . . some 30 cups, trophies and other awards. Championship Cups for permanent retention. A win confers "Expert Status!"

ENTRY CLASSES

Examples of every form of modelmaking activity can be entered. Model engineering masterpieces such as locomotives, traction engines, aircraft, boats, cars . . . or simple plastic creations . . . there is a class for you. Classes include Military Models (six classes) and Craft entries (Furniture, glass fibre, etc.).

WHAT WILL BE ON DISPLAY

THE MAIN HALL will be laid out in a completely different manner, offering a grand " open plan " scheme with more room for models, which will be grouped under the gallery balcony and in the centre, with a WINNERS' PODIUM to display class champions. The popular S.M.E.E. PASSENGER RAILWAY enjoys its usual position, but with the added feature of the immense 2-8-4 Berkshire Superpower 10¼ in. gauge locomotive based on its American prototype and destined to operate on Lord Gretton's Stapleford Park Railway. This is nearly 19 ft long and will be on show alongside the track. Another locomotive specially built for Stapleford Park will also be on show at the entrance—The Hon. John Gretton's ROYAL SCOT—a fine scale model embodying many of his own design features.

A FLYING CIRCLE stretching right across the hall from balcony to balcony will be available for electric model aircraft flying. This will be at BALCONY LEVEL and provide splendid and spectacular sport with electric models doing nearly all that more powerful outdoor i.c. engined models do—or so we hope!

TRADE STANDS—fewer in number than before, since " club " and other special stands are in another hall—are tastefully grouped in three units, giving convenient access in the MAIN HALL.

Introduction of a MODEL ENGINEER WORKSHOP manned by the S.M.E.E. last year proved immensely popular and will be increased in size and scope, again with experts from S.M.E.E. in charge and assisted by M.E. consultants. Working models under compressed air will also be on show.

BRYANSTON ROOM will be operating as the CLUBMEN'S CORNER with stands manned by the principal governing model bodies of the country, plus club units demonstrating, and offering combined club "little exhibitions." Demonstrations of power tools will also be shown. This hall will contain the TRACTION ENGINE entries, and wall showcases of small exhibits.

LECTURE HALL will be arranged as the BATTLEGROUND with four WARGAMES TABLES for regular miniature battles, where clubs will be invited to run wargames of all popular periods, with opportunities for running commentaries. MILITARIA entries will be displayed here.

BOATING MARINA: For the first time we have taken the SMALL SWIMMING POOL to operate as a nearly 100 ft long indoor lake for boating activities. R/C boats will be demonstrated daily. Evenings will be given over to inter-club and individual contests. Pool will also be big enough for some steam powered boats to operate by arrangement.

GALLERIES will provide sitting out space, spectator room and house additional club displays including our favourite BOYS' EXHIBITION. Furniture and craft entries under the auspices of *Woodworker* will be on show.

SOUVENIR GUIDE

Another CHRISTMAS EXTRA issue of *Model Engineer* will be coming out 2nd Friday in December with entries, trade stands, articles galore to assist the visitor and solace the stay-at-home.

PRIZE POOL ALLOCATION

Classes attracting six or more entries will enjoy prizes to value of 1st £5; 2nd £3; 3rd £1. With over 12 entries 1st £7, 2nd £4; 3rd £2; 4th £1. Classes under six will have 1st & 2nd only, or at discretion of the judges may be combined with other classes.

REFRESHMENTS

Snack Bar in the Balcony Cafe, with teas, soft drinks, sandwiches, cakes. Restaurant Service (licenced) available on ground floor. Parties may book in advance.

ADMISSION

Price of admission at the door will be 25p adult, 15p child. A child is regarded as anyone still at school. Children under 5 who have not started school and are accompanied will not be charged.
Reduced admission charges for pre-booking as under:
Single and small number pre-booking tickets available from these offices. Adult 22½p, Child 12½p. Parties of more than 10: Adult 20p, Child 10p, Teachers i/c parties free—one per 10 in party.
A combined family ticket can also be bought in advance.

Advance Bookings and details from:
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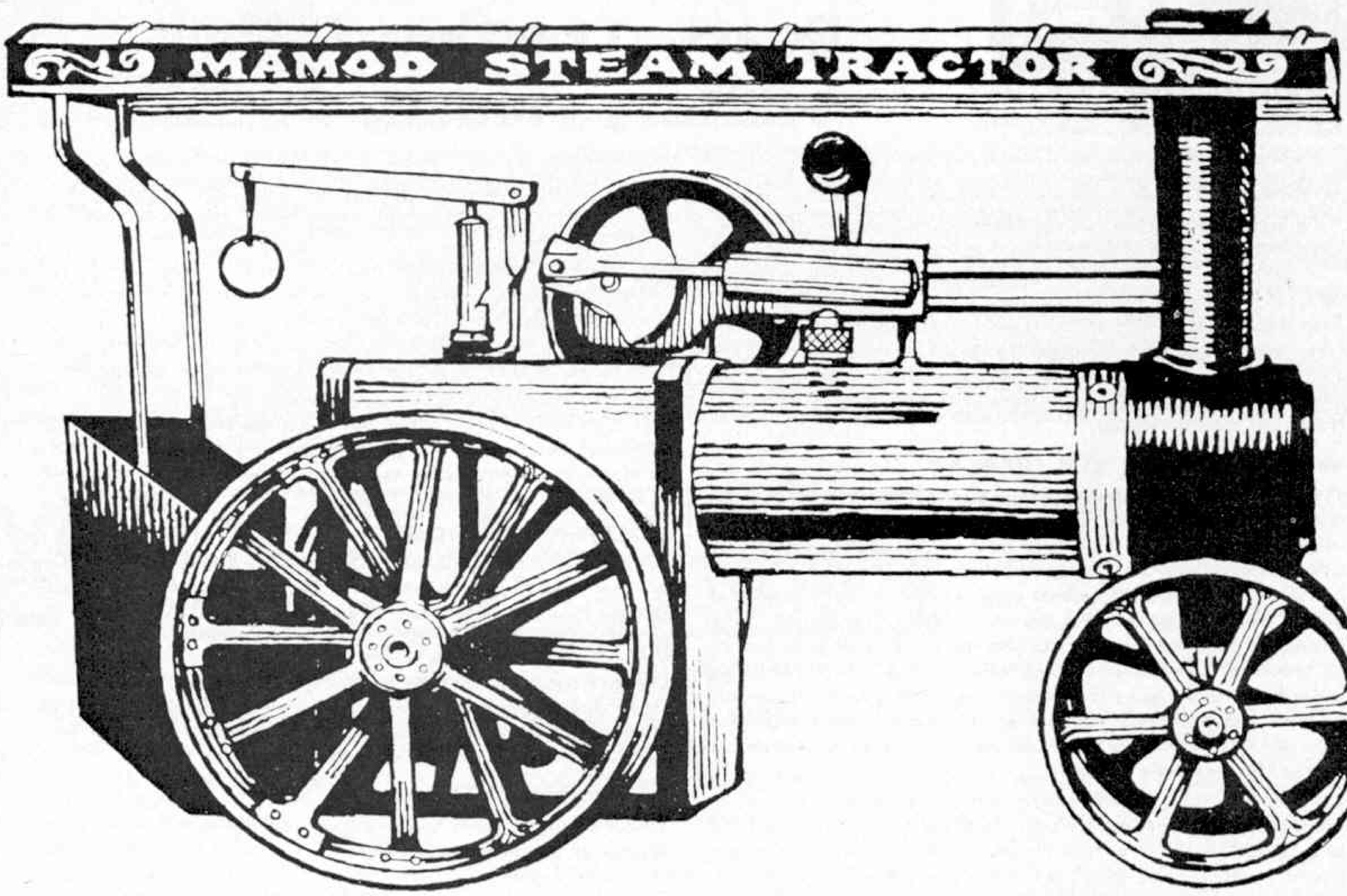

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Meccano Statement

Those readers who have written to enquire about the future of the Meccano system and Dinky Toys will be encouraged to hear that Mr J. Fallman, Chairman and Managing Director of Meccano (1971) Ltd., has issued a statement (primarily intended for retail shops) stating quite firmly that the production of Meccano and Dinky Toys etc., is continuing normally and will do so in the future. Demand for these products is in fact running at a very high level and apart from any seasonal pressure, deliveries from the factory will be carrying on completely normally.

Rover Service

The last couple of pages to be proofed by the printer for our October issue arrived after our departure for Belgium and the European Championships. Alas, there were a couple of slips, notably in the little item on the Rover Mobile Service School, where it should obviously have mentioned the Specialist Car Division of British Leyland, not the *Socialist* Car Division. Earlier on the page mention is made of cars travelling at 60 m.p.g. which clearly should have been m.p.h. We hope and believe that such errors only rarely slip through, but perhaps this only makes the ones that do more obvious. Sorry!

How To

Next month we shall be starting a new series on Meccano Parts and How to Use Them, which may sound rather obvious but which will, we think, produce quite a few surprises, possibly even for veteran Meccano users. We are sure that it will be at least equal in value to the Constructors' Guide series which proved so popular last year and which, incidentally, will be appearing in book form early in 1972.

Pocket Meccano Competition

What is virtually a "stop press announcement" is the result of the Pocket Meccano Competition which was judged by the editors of four magazines, Toys International, British Toys, Games and Toys, and Meccano Magazine. A full report will be appearing, but we can say what a resounding success this competition proved—some 750 different models, all built from the basic 18 pieces (plus nuts and bolts) of the Standard Pocket Meccano set, and many of them masterpieces of ingenuity which amazed even experienced Meccano builders. On the grounds of originality, and ingenuity and standard of construction, the judges picked as top of the 8 year and under group a prehistoric bird (complete with worm in bill!) by Jonathan Thompson of Lymington. In the 9–12 years section the winner was a simple and amusing dog which jumps along under finger pressure, by Mark Knowles of Salisbury. In the "senior" age group, 13–15, the model judged best was a tower crane with working hoist and trolley and neat stabilising arrangement, by Dixon Upcott, of South Harrow.

Details of these models, and the other 30 prizewinners, will be featured in our pages. As we said, this amounts to a stop press addition for this issue.

Swaps

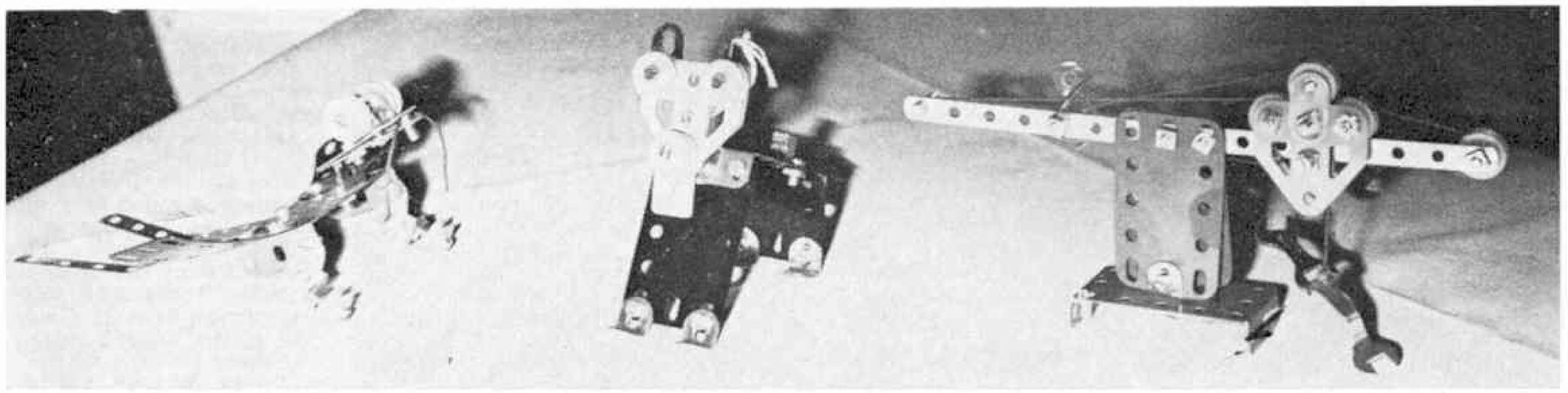
The first "swap meeting" of the Portsmouth Static Model Vehicle Club proved so successful that a second has been arranged for November 27, at St. Nicholas' Church Hall, Battenburg Avenue, Portsmouth, starting at 2 p.m. So if you are a collector and want to swap early Dinkies, etc., here's your chance.

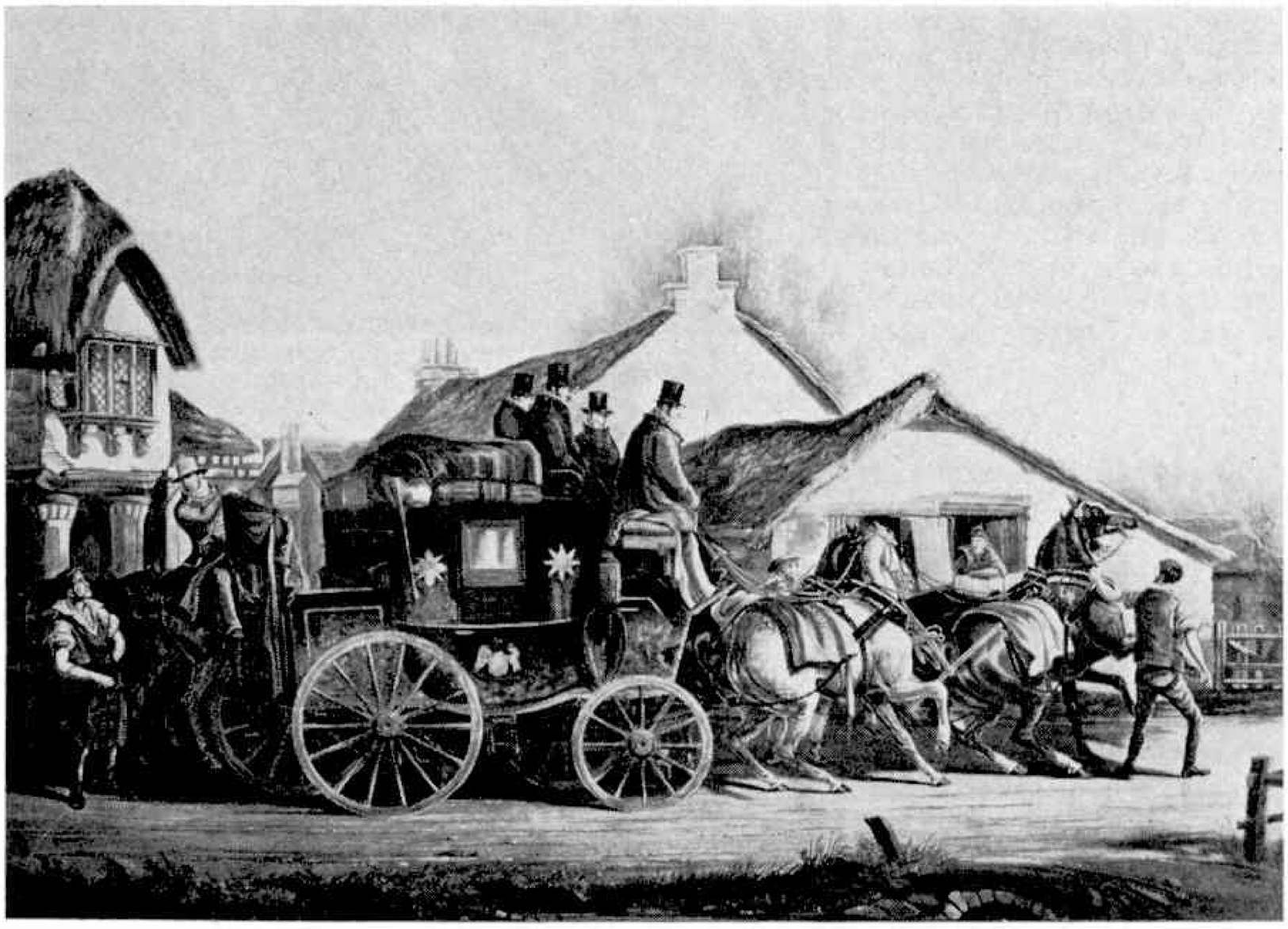
Exhibitions

Norbury and South London Transport Club's annual exhibition will be at Stanley Halls, South Norwood, London, S.E.25, on Saturday November 13th, from 10 a.m. to 9 p.m. and on Sunday 14th from 11 till 5. Admission is 15p adults and 10p children.

The year's major show, the Model Engineer Exhibition, is Jan 4–15 (except Sunday) at Seymour Hall, Marylebone, London W.1. Among all the goings-on there is a competition for straight-running boats (aimed at targets) powered by any electric motor but not more than four U2 or HP2 size batteries. A simple boat will appear in plan form in December's *Model Boats*, but any suitable model can be entered. The event is intended to encourage inexpensive models, and we are running it on the 100 ft swimming pool on several evenings. Why not have a go at building a suitable model? There's no entry fee!

Photo below shows the three winning Pocket Meccano models snapped immediately after the judging. Heavy shadows from the flash, and the identifying number labels, slightly confuse the picture, but we shall be showing good clear photos of all the top models in the next issue or two.





STAGE COACH DAYS

BY TREVOR HOLLOWAY

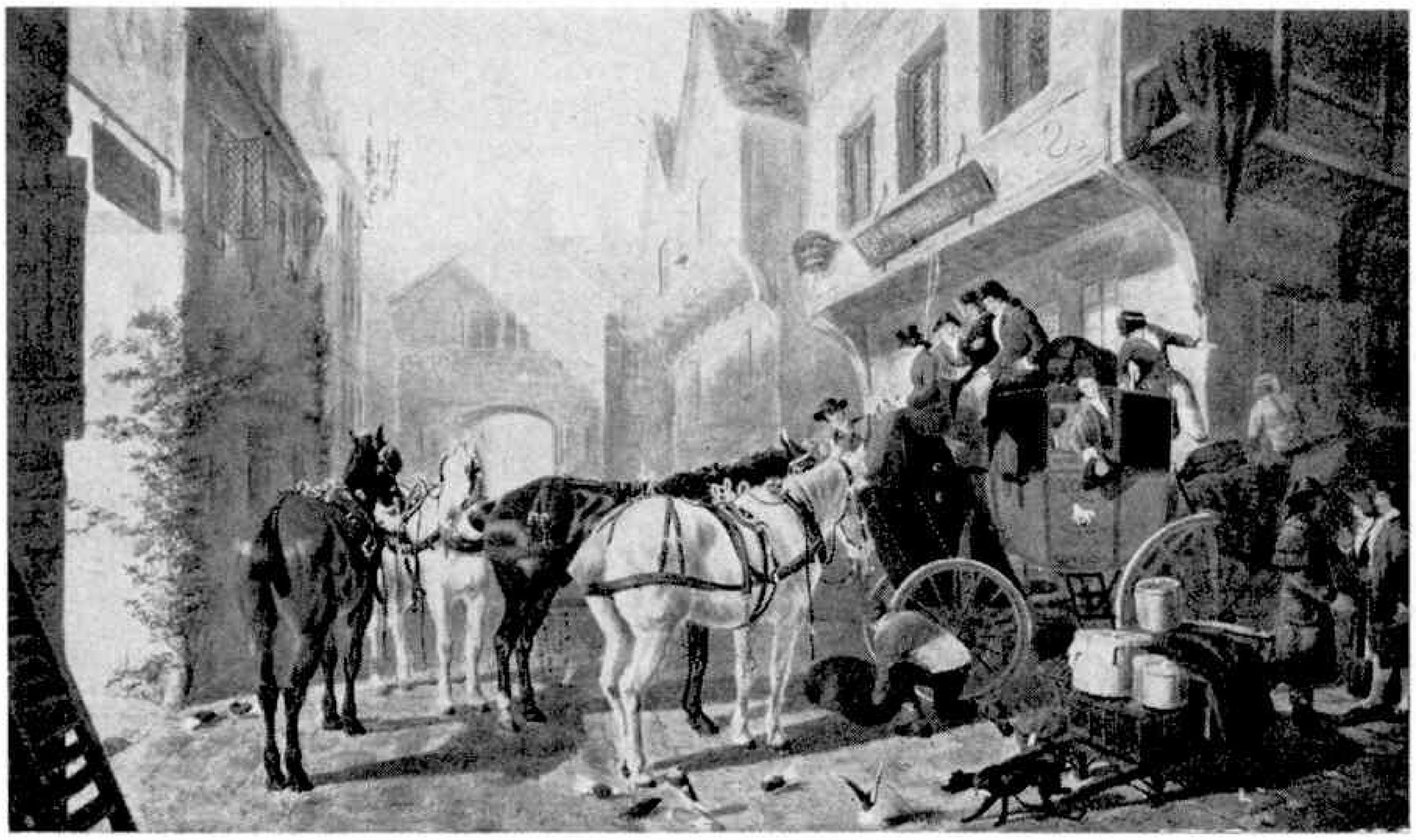
PERHAPS the Christmas card artists are to blame for giving the impression that stage coach travel was a pleasant and romantic form of transport. If the truth must be told, it was often a most uncomfortable experience—and a somewhat risky venture, too. So much so that it was a common practice for passengers to make their wills before setting out! Accidents were frequent, breakdowns common, and the possibility of hold-ups by highwaymen was not to be overlooked.

The appalling state of the roads, coupled with the fact that many of the coaches were slung on leather straps, caused much discomfort in the form of 'coach sickness'. An unhappy traveller of the 18th century wrote: "This travell hath soe indisposed mee that I am resolved never again to ride in ye coatch"!

Today you could catch a train at Waterloo and be at Salisbury, 82 miles away, in about 90 minutes. In the 17th century a coach left the "George", in Aldersgate Street, London, on three days in the week—and took two days to do the same journey!

In 1667, a coach proudly named the "Flying Machine" began running from London to Exeter. Flying machine? Not exactly, for it took five days to reach Axminster, in Somerset, and another day to complete the run to Exeter. An advertisement stated that provision was made for male passengers to have a shave on the journey. They must have needed it!

The speediest coaches averaged about 11 m.p.h., but 10 m.p.h. was considered normal for the majority of four-in-hand mail and stage coaches. The type of vehicle known as the "Flying Machine", common in the 17th century, was more in the nature of a covered



"All Right" is the title of the top picture which is from Fores' "Coaching Recollections" and shows an Exeter–London Royal Mail Coach. Left, a Post House, from a coloured print by permission of Messrs J. H. & J. Brooke. The board over the door spells "Licenced", still a common error! Coach is on the York–London (Fetter Lane) run. (Post Office photos.)

waggon. It certainly never came near to flying, for it was drawn at walking pace by a team of eight horses, with the waggoner trudging beside the leading pair. Three m.p.h. was a highly gratifying performance—but very seldom averaged.

The famous Colchester Flying Machine was described as: "Seating six persons inside; outside, behind the coachman, four more, and at the back, where the trunks usually go, as many again on benches, while eight people were above on deck, their feet dangling overboard, holding fast by their hands to screwed-in brass rings."

These heavy waggons so cut up the roads that after 1766 they were compelled to have wheels not less than 16 in. broad, and a bonus was given for those which were over 2 ft. in breadth! Their one redeeming feature was the cheap fare—1d. per mile.

Much as we grumble about present-day road and rail transport charges, the 19th century stage coach rates were too stiff for the majority of ordinary working class people. Here are the coaching expenses of a family from Wimpole Street, London, who made an excursion to Tunbridge Wells, a distance of about 40 miles, in 1820:

To Lock's Bottom, 16 miles	£2	8	0
Boys		8	0
To Sevenoaks, 11 miles	1	13	0
Boys		6	0
To Tunbridge Wells, 13 miles	1	19	0
Boys and Ostler		8	0
Turnpikes and Booking Trunks	1	0	2
Carriage and Expenses of 4 Servants	2	12	6
Carriage of Baggage	1	5	6
Total	£12	0	2

It must not be forgotten that in 1820 £12 was worth very much more than it is today.

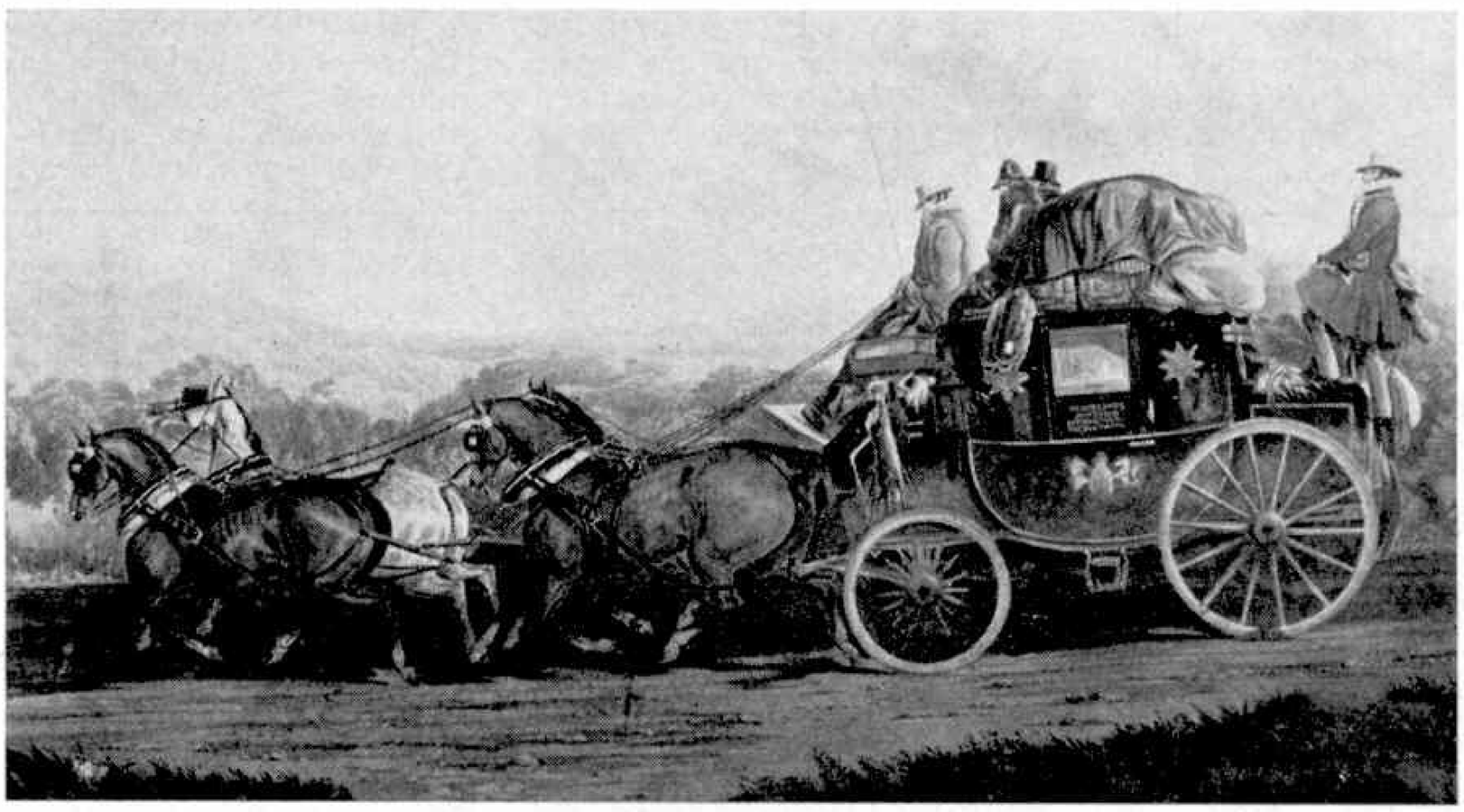
The post-chaises operated by the landlords of the better class inns were even more expensive. Rates were often 1s. 6d. a mile and the post-boys and guards expected to be tipped at the rate of 3d. a mile.

The first coach seen in London made its appearance in 1555, but it was a century later before regular services began to operate between the important towns and cities. Gradually coaching became a business of considerable size and the trade done by a certain William Chaplin would have made even the largest of the present-day motor coach proprietors envious.

By 1832, Chaplin owned 3,000 coaches, 150,000 horses, employed 30,000 drivers, guards and ostlers, and ran 27 mail coaches every night out of London.

Over 700 Royal Mail coaches were in operation in 1835 and the mass departure of many of them from the old G.P.O. headquarters at St. Martin's le Grand was a fine spectacle indeed. In the words of Thomas de Quincey: "Every moment you hear the thunder of the lids locked down upon the mail-bags. Then come the horses into play. Horses! Can these be horses that bound off with the action and gestures of leopards? What stir! What sea-like ferment! What a thundering of wheels! What a trampling of hoofs! What a sounding of trumpets!"

It was almost a nightly occurrence for coaches carrying mail to be halted and robbed and armed guards travelled on every coach. Here is an extract from a warning notice issued to all mail coach drivers in March, 1802, following a series of very daring robberies by highwaymen:



Also from Fores' "Coaching Recollections" is the Gloucester–Hereford–Carmarthen–Aberystwyth coach and the title is "Pulling up to unskid", the skid being visible under the hind wheel, preventing it from rotating and thus braking the coach down a hill. (Post Office photo.)

"You are directed to be particularly vigilant and watchful, and that you keep a quick eye to every person stirring; and see that your arms are in the best possible condition and ready for instant duty!"

Another warning poster, issued by the G.P.O. and dated 16th July, 1827, read: "100 Guineas Reward. Whereas on the night of Thursday, the 12th instant, the Driver of the mail between Leatherhead and Dorking was feloniously stopped by Two Men opposite Givon's Grove, when the Men fired two Pistols at the Driver, and severely wounding him. Whoever will come forward and give such Information as may lead to the Apprehension and Conviction of the Offendors shall receive a Reward of One Hundred Guineas."

The guards on many of the coaches were often a greater nuisance than the highwaymen. To amuse themselves en-route they would take pot-shots at cats, dogs, sheep and pigs or any inviting target they spotted from their lofty perch. One, in fact, killed a toll-keeper. Some of the drivers were almost as irresponsible, and one of their pastimes was to smash in window panes with an expert crack of their whip as the coach dashed past!

Guards on the majority of coaches were paid only 10/6d. a week, out of which they bought and maintained their own blunderbusses, pistols and cutlasses, as well as oil for the two front lamps. But as an important

coach was expected to yield up to £500 a year in tips, the guards didn't do too badly.

They also did a considerable bit of business 'on the side'—black-market deals for traders in different towns, the carrying of letters and packages at lower than the G.P.O. rates, etc. And if an extra passenger could be squeezed in, the driver and guard would pocket the fare!

Summer travel, apart from jolting and frequent overcrowding, was at least bearable, but in winter it was a very different story. With no means of heating, passengers suffered untold misery from cold—especially cold feet! As one traveller remarked: "My feet were numb, though there was straw enough on the floor of the coach to conceal a covey of partridges"!

Snow, of course, made coach travel a nightmare. The exceptionally heavy fall during Christmas, 1836, dislocated practically every coach service in the country. The mail coach from London to Exeter had to be dug out five times, whilst another strayed off the road a few miles from Louth and went headlong down into a gravel pit.

Near Chatham the snow lay to a depth of 30 ft. and 400 soldiers were called out to extricate stranded passengers and horses. Many other coaches were trapped on a 26-mile stretch of the Dover road blocked by an impenetrable mass of snow varying from 3 ft. to 18 ft. deep. At Dunchurch, near Coventry, 17 coaches had to be abandoned in drifts up to axle level.

"Quicksilver" was a famous coach that plied between London and Exeter. One pitch-black night, shortly after climbing up on to Salisbury Plain, the horses became restless and extremely difficult to control. In the feeble light from his headlamps the coachman saw what he first took to be a stray calf trotting alongside. He very soon realised his mistake, for the 'calf' suddenly made a savage attack on one of the horses. It was a lioness that had escaped from a travelling menagerie!

In 1827, a coach bringing passengers to London for the Christmas ran into thick fog and was driven full-tilt into a muddy pond on Hounslow Heath. One of the outside passengers was flung head-first into the mire and drowned before he could be pulled out. The remaining four lady passengers managed to scramble to the bank covered in weed and slime. We doubt if *they* thought stage travel very romantic!

A motor coach would not look very seasonable on a Christmas card, but there's lots to be said in their favour as far as comfortable road travel is concerned. Nevertheless, as the Christmas card artists know well, for all its short-comings the stage coach makes a fine picture—one of the best-sellers in the Christmas card industry. It's a fairly safe bet that such a card will drop through *your* letter-box as usual this Christmas. And you will probably send off one or two yourself!

Painting by Numbers

Meccano Magazine takes a look at some of the sets available

Two samples by a 12 year old from Series Two (two 12 × 6 in. pictures, 10 colours, 63p) one each from "Tropic Lagoon" and "Forest Deer". The palm trees were, we felt, especially effective.

JUST about everyone has heard of paint-by-numbers sets, but when we asked around, we could only find one person who had actually had a go at one, though several said they'd often thought they'd like to try. It seemed a good idea, therefore, for us to sample some of the very wide range available and record our impressions. Messrs Airfix Ltd., were kind enough to supply several outfits, ranging from the absolute beginners through to quite advanced sets, and we tried these out on a range of age groups from about 10 years old, teenagers, and young as well as mature adults.

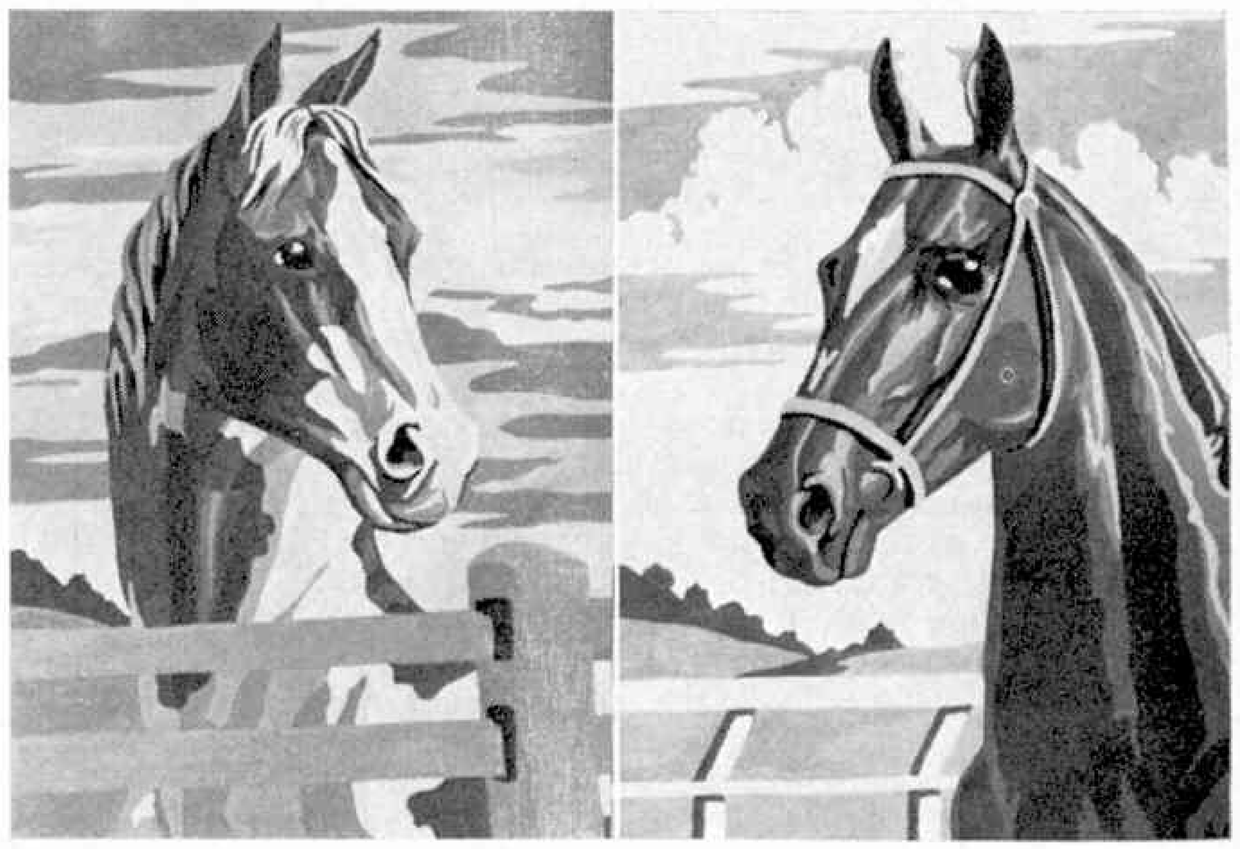
From the outset, it must be made fairly clear that this is not like conventional oil-painting, where colours are painted on one over the other. The application of patches of positive colour, with no gradual shading off, is perhaps more akin to the type of painting produced by applying colours with a palette knife, and the effect is therefore much more pleasant from a few feet away than in close-up. The results are very attractive, and we admire the skill of the artists who originate these pictures.

Without exception, everyone who tackled one of the sets enjoyed it immensely and produced a pleasing result irrespective of artistic skill or lack thereof. Everyone was, however, astonished at how long it took. Many of the sets include two related pictures, and a rough calculation indicates that the time required to complete the pair is in general about one hour for every colour supplied. Thus a two picture set with 22 different colours will take some 22–24 hours of painting to complete both paintings, so that taking into account the cost of such a set (Series Three) of £1.20, the actual cost per hour of enjoyment is very low, and you have a couple of permanent paintings at the end.

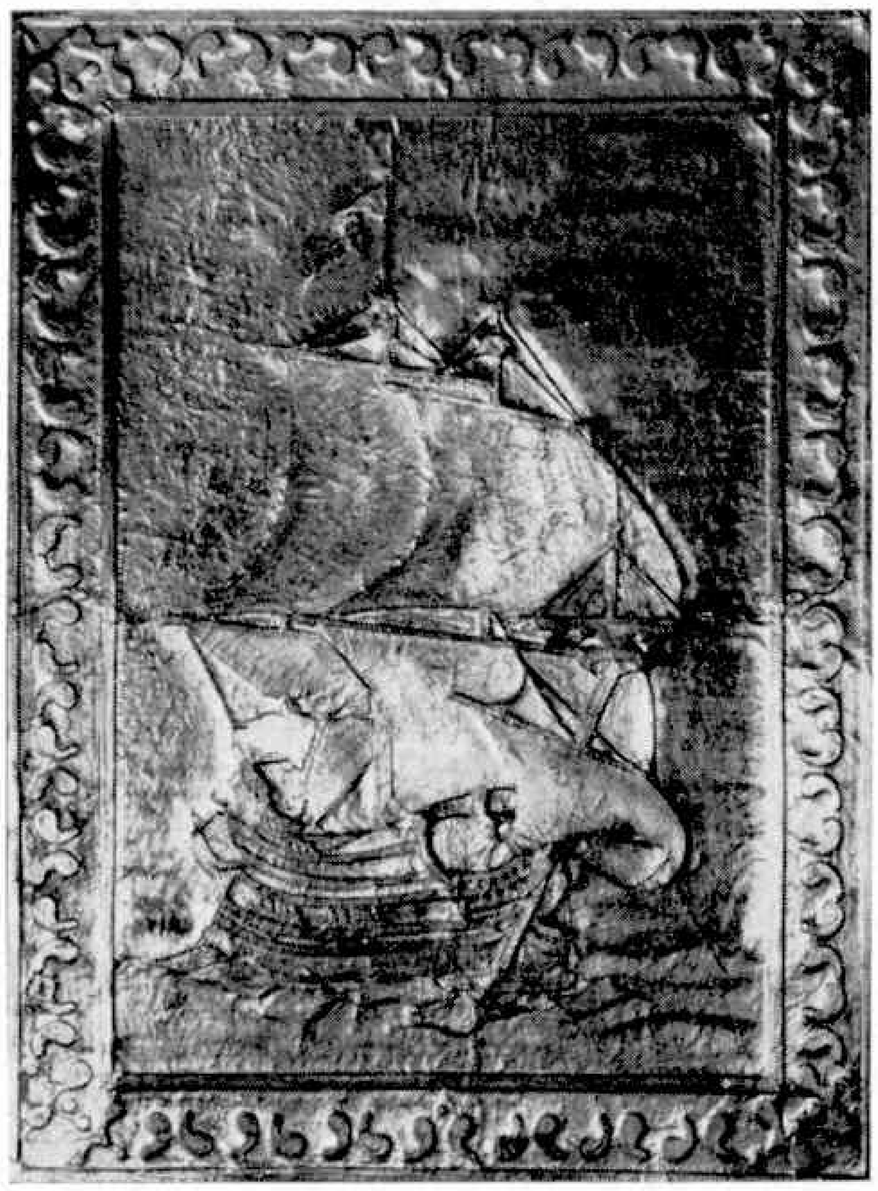
Twelve hours each for the pictures above by an experienced adult, "Mountain Lakes", Series Three (14 × 10 in., 22 colours, £1.20), but a colourful and attractive end product. Mountains first class, especially shadows, but trees not so good.

Who do these pictures appeal to? Well, the finished ones to everyone, and the idea of painting them to a majority. They are splendidly therapeutic—ideal for an invalid or convalescent, or someone who wants to relax completely for a while. People who have dabbled with painting and faced the fact that they lack the basic talent will not only enjoy doing these, but will find that they can adapt the technique, once they are used to it, to paint pictures based on photographs or other people's drawings; you can learn quite a lot about the use of colour from these. And, of course, people of any age who just like painting will get a lot of pleasure from them. Even if it may not be true creation, painting by numbers *is* creative and thus is immensely satisfactory.

Technically, there is little to say. The paints are provided in small plastic containers with lids which seal well; their consistency varies, but any which are too thick to flow can be thinned with a little linseed oil. As is typical of artists' colours, they do not run into each other, and they take about three weeks to dry. Instructions given with the sets are brief, but quite adequate. The brushes supplied in assorted sets vary in build as must be expected of inexpensive ones; if you were unlucky and got a below standard brush in the set you'd bought, it pays over and over to buy a better one. If you get hooked on these paintings, a couple of good artists' brushes would be an investment. A good brush makes the work quicker, cleaner and neater and greatly adds to enjoyment. Most of the brushes in the sets were quite up to the job, though a packing error had resulted in no brushes in a couple of sets. One other minor point on a No. 3 was that three of the 22 colours were so closely identical that no difference was detectable in artificial light, and a final difference in shade was only



Horses above by two young ladies around 20, neither particularly used to painting. Also Series Three (22 colours, 14 × 10 in., £1.20) "Thoroughbreds". Below, from the Junior New Artist range (6 colours, two 8 × 6 in. panels, brush) "Rugged Coast". One of these by a 12-year old girl, the other by her mother, neither experienced in painting.



just discernible in bright daylight. The colours were greens, and if this happened again we would mix in a tiny touch of yellow or white to give just a little more contrast.

All the paints need thorough stirring with a matchstick or similar before use; about the only painting tip we can pass on is never load the brush too heavily (wipe it on the side of the pot to remove excess and to shape the bristles) and steady the brush-hand on the other hand or on a bridge made from a pair of books and a strip of wood. This gives much greater control of the brush. Control obviously affects the crispness of the finished result, more particularly with the more advanced sets where tiny or narrow areas of colour occur. Thus the age at which a youngster might be expected to make a fair job of one of these paintings will vary according to individual patience and neatness with a brush.

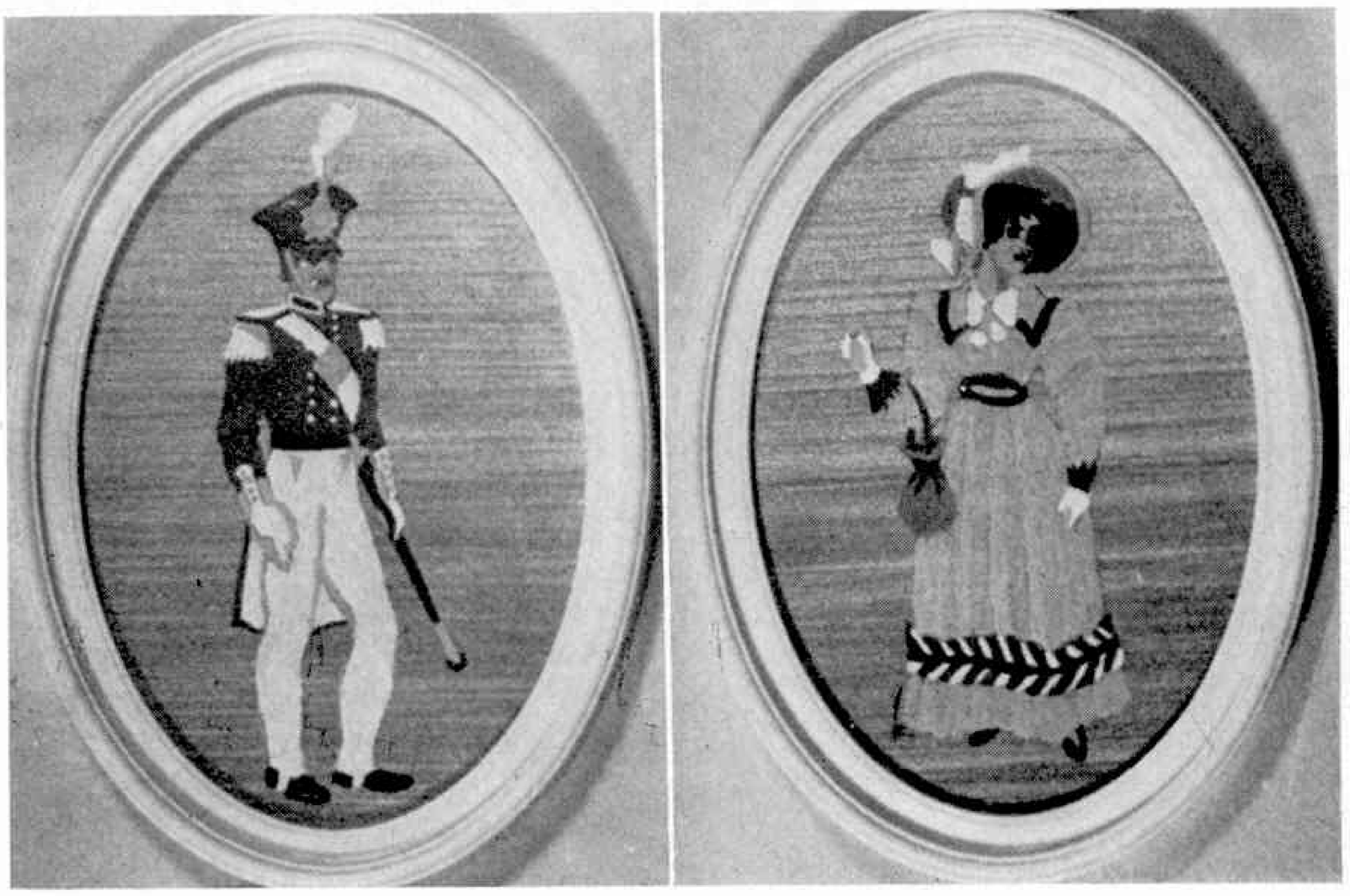
To sum up, the sets are good value in terms of content and hours of occupation, and most people thoroughly enjoy them. The results are attractive, depending on one's taste in pictures, and the techniques broaden one's knowledge of colour usage and light and shade, etc.

Frames

In the same general range are two series of single pictures which come complete with plastic frames, and two series of oval miniatures, each outfit having a pair of 7 × 5 in. oval frames and ten colours. The rectangular and one set of oval are conventional paint-by-number pictures, but the second oval series each comprises a military figure and a contemporary lady forming an attractive pair. These are likely to appeal to militaria enthusiasts, though really keen ones with references may well modify the uniforms to incorporate additional small details. These ovals seemed generally much more likely to finish hanging on a wall than the "square" pictures, perhaps because they are small and dainty and thus appeal more to the ladies.

Foilcraft

Rather a different art form is the Foil Craft series of eight pictures. In these, a picture is built up from layers of card and then covered by soft aluminium foil which can be coloured lightly. The picture is printed on a card background with a frame for which die-cut card pieces are supplied. The card pieces to build up the picture are printed separately and have to be cut out with scissors or a modelling knife and glued in place. Everything needed is supplied, and again, it is a lengthier job than one might imagine. Our main criticism is that the sheet of foil supplied comes roughly folded into four and we found it impossible to remove the wrinkled creases when it came to rubbing the foil down on to the picture. On the whole, people who saw our samples admired them and they are certainly attractive and unusual; they do, however, take time and perhaps a little more skill than the paintings to get a really good result.



Foilcraft Series Two Galleon, above, is 16 × 12 in., £1.50. "Silver" foil can be toned down with colours for attractive effects; harder to make successfully than might be expected. Miniatures on left are by a 16-year-old and are colourful and attractive. A little extra work on them to soften shade lines, etc., would be desirable. Overall, there is a choice of some 132 (no less!) painting outfits, from race-cars to fashion, animals, ships, etc., at prices from 35p to £2.89.

The World's Strangest Ant-eater

By Frank Madigan

THE ant-eaters of the world are more different from each other than perhaps any other species of animals in the whole world of nature. In size alone they range from the giant six foot long ant-eater of South America to the graceful Banded Numbat of south-western Australia.

The strangest ant-eater of them all is undoubtedly the marvellous and unique Echidna or Spiny Ant-eater of Australia. For, in common only with the platypus, the Echidna lays eggs, yet it suckles its young, though without teats, but exudes its milk through its pores.

These two creatures, the Australian monotremes, fit in between the higher mammals and reptiles, and are known to scientists as 'oviparous mammals'. As far as their brain, skeleton, metabolism and reproductory systems are concerned, they are considered to be a living link with mammals, birds, fishes and reptiles, and one of the most primitive types of creatures left on earth today.

The Echidna or Spiny Ant-Eater can be regarded as a mixture of contradictions and yet, from a more discerning point of view, it could be claimed to be one of nature's masterpieces of adaptability.

This creature is covered with protective sharp-pointed quills, though it has no relation to the porcupine which, to some extent, it resembles. It hibernates during the winter, choosing its sleeping quarters in hollow logs or in rock crevices that are well sheltered.

The Echidna, like the marsupials of Australia, has a pouch for carrying its young. But a distinctive peculiarity in this case is that the pouch comes into being only for maternal purposes, when required for the offspring. When they reach maturity and can fend for themselves, it closes up.

Another strange fact about this eighteen inch long creature is that it has been endowed with a long tongue covered with a sticky fluid. When the tongue is inserted into ant-holes for food, it attracts the ants by the hundreds. Then the Echidna pulls its tongue in.

This Ant-Eater uses its strong claws to dig into termite mounds, and once this has been done, it uses its snout as a crowbar. Then the tongue does its work of licking up the insects, which are ground up by the horny areas of the tongue, running against the palate. Thus the food is ground up, as the Echidna does not possess any teeth.

The quills of this animal are capable of digging quickly into the ground, thus making it possible for it to disappear very quickly, when necessary. The feet are also used for digging, and the long, spade-like nails throw the soil away to the side. So the Echidna gradually sinks into the hole it is digging.

So powerful are its claws, that they have been known to penetrate concrete, where there has been a crevice through which it could pierce. Many have been known to escape from captivity.

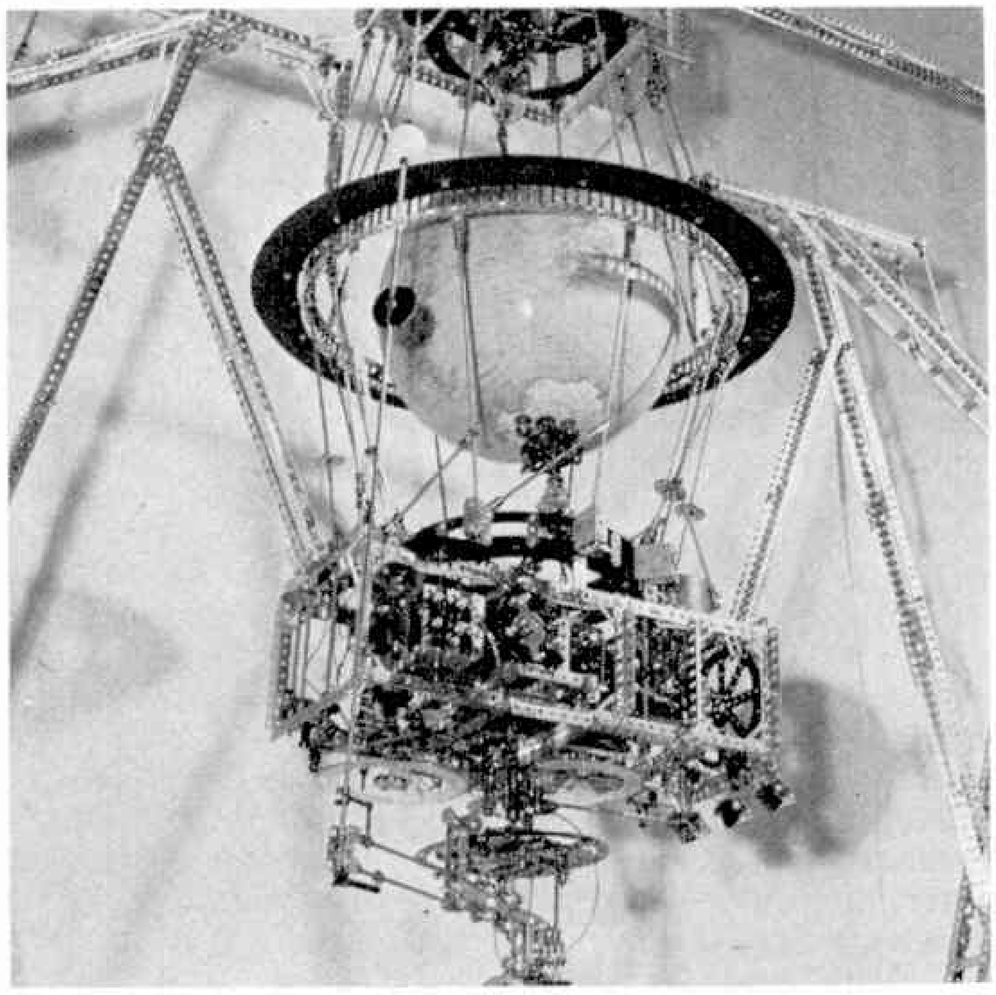
But in captivity Echidnas actually thrive. One was recorded as having lived for fifty years. They have such tremendous strength, however, they often cause great havoc domestically. One naturalist put an Echidna in his kitchen overnight, for want of a better temporary lodging. In the morning the room was a shambles, as it had shifted everything except the kitchen stove.

Yet another creature was strong enough to push up the lid of the box it was kept in, which weighed some eighty-three pounds. Fortunately, the Ant-Eater only uses its amazing strength in defence, and it is quite harmless to mankind.

The only living monotremes—the platypus and the Echidna—have been isolated for centuries in Australia, the scientists say. Yet they have really little in common. Today, the aquatic platypus is becoming very rare, but the Echidna is becoming quite common, perhaps owing to its conveniently sharp spines, and also to the fact that its habitat is in every type of country, except the desert.

A TELLURION

An astounding astronomical instrument built by Graham Hyland, introduced by 'Spanner'



An underside view of the Tellurion looking upward to show the date and year protractors and regression plate for the Moon's nodes.

'SPANNER' writes—"The author of this article, resident in Beckenham, Kent, is a scientific instrument maker with considerable Meccano experience behind him. This magnificent model, which reproduces the movements of our Earth and Moon and illustrates their effects on day and night, tides and seasons, etc., qualifies as a scientific instrument in its own right and was in fact built as such to aid Mr Hyland in his hobby as an Amateur Astronomer. I cannot claim to fully understand all the workings and calculations involved in the model, but I nonetheless felt it should be featured here for the interest of our advanced readers. Interesting it certainly is!"

A TELLURION

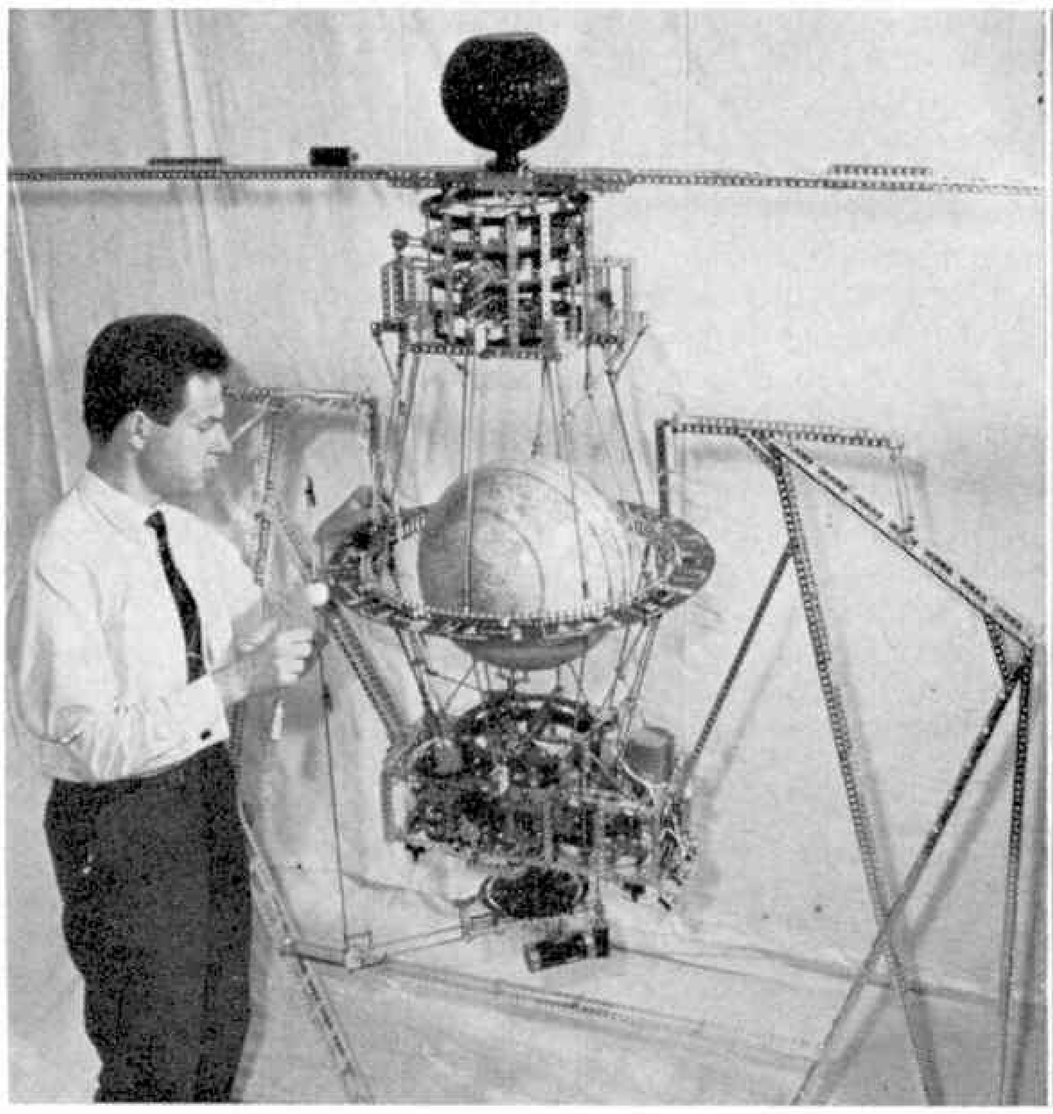
Built and described by
Graham Hyland

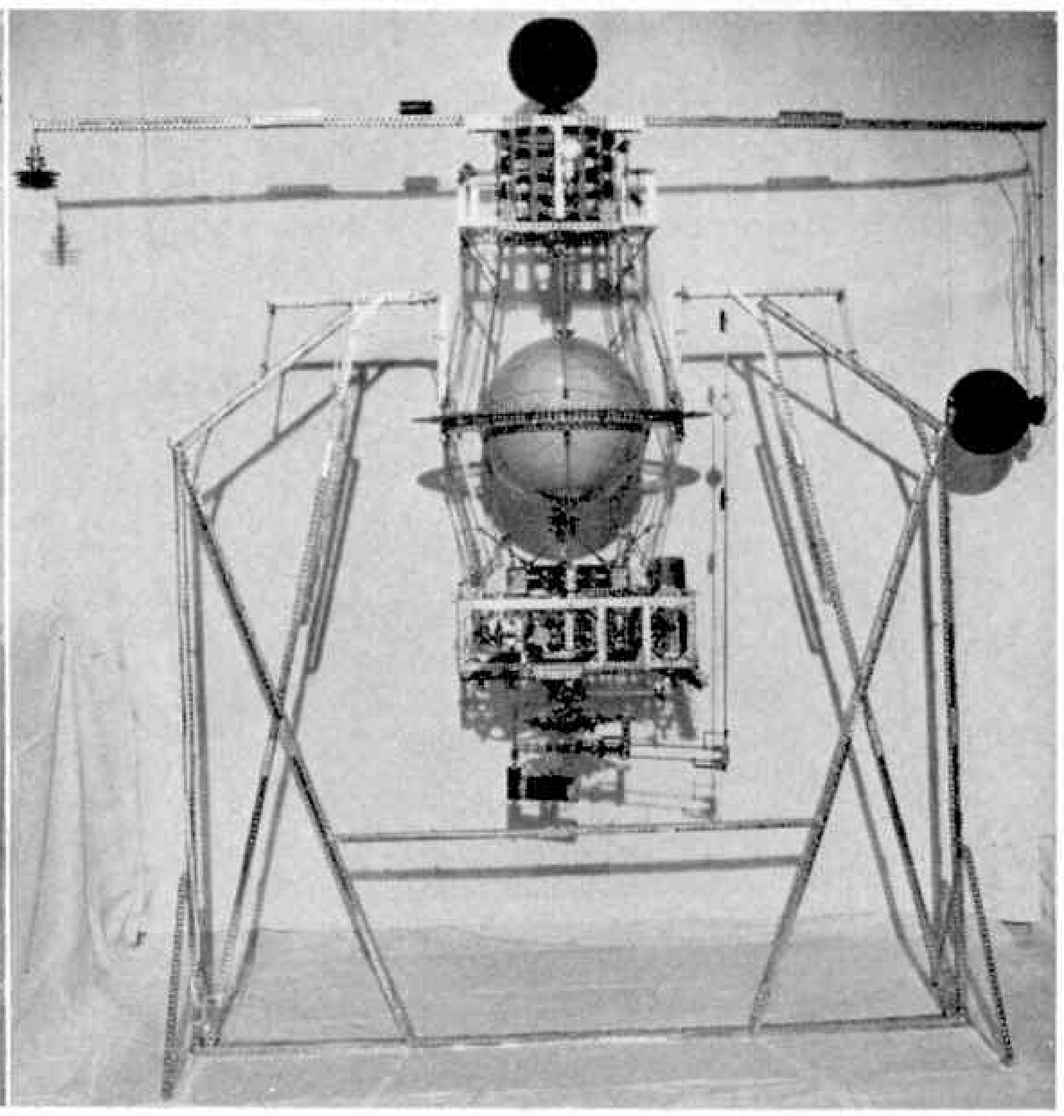
The Tellurion can duplicate varying motions of the Earth and Moon as closely as possible to reality using Meccano gearing, the motions of course being speeded up in order for them to be followed in a reasonable space of time. The model uses 139 gears, ranging through Pinions, Bevels, Helicals, etc. and it has a height of 7 ft. 2 in., a frame width of 6 ft. 3 in. and the weight of approximately 7 st. (98 lb.).

In operation, one revolution of the motor is equivalent to a quarter of an hour, so that a ratio of 96:1 from the motor equals one day. At a point where the ratio is 48:1, i.e. 12 hours, a subsidiary ratio branches off to rejoin the main drive at the 96:1 point, where a differential is situated. The purpose of this subsidiary ratio is to add $\frac{1}{15}$ to the 96:1 ratio, making $96\frac{1}{15}$:1 by controlling one of the differential half-shafts.

The problem was to get as near as possible to 365:1 for the number of days in the year. Eventually I arrived at $2 \times 5 \times 7 \times 5\frac{3}{14}$, the total equalling 365:1. The $5\frac{3}{14}$:1 ratio was obtained by using the 73-teeth section of a Ball Thrust Bearing (Part No. 186b) with a 14-teeth Sprocket and Chain.

As the model Earth spins at exactly 96:1, i.e. 24 hours, and with the $96\frac{1}{15}$:1 ratio via the differential equalling 24 hrs. 1 min., this means that, after every 365 days,





there will be an excess of 365 minutes for the Earth to make up, or 6 hrs. 5 mins. Comparing this against the true sidereal year, I found that there is a discrepancy of 4 mins. 10 secs. which means a manual correction of 1 deg. on the date protractor after each year revolution and an additional 1 deg., making two in all, after every 24 years to compensate for the odd 10 seconds of each year.

So far mentioned is the 24 hour cycle, this being the time for the solar day. To find a reading for the true sidereal day of 23 hrs. 56 mins., 4 secs., it is necessary to deduct 1 deg. per day for 59 day revolutions, missing out on the 60th day, and so on. As the Sun travels round the model through the Zodiac constellations by approximately 1 deg. per day from West to East, and with the Earth revolving on its axis in the same direction, the difference between the sidereal and solar years works out at approximately 20 minutes on the zodiac ring.

The big solar arm at the top of the model (length 8 ft. 4 in.), which runs round on a turntable, has not been centrally pivoted, but has been offset. The reason for this is to obtain aphelion 4th July and perihelion 3rd January, these being the dates when the Earth reaches its nearest and furthest points, respectively, from the Sun.

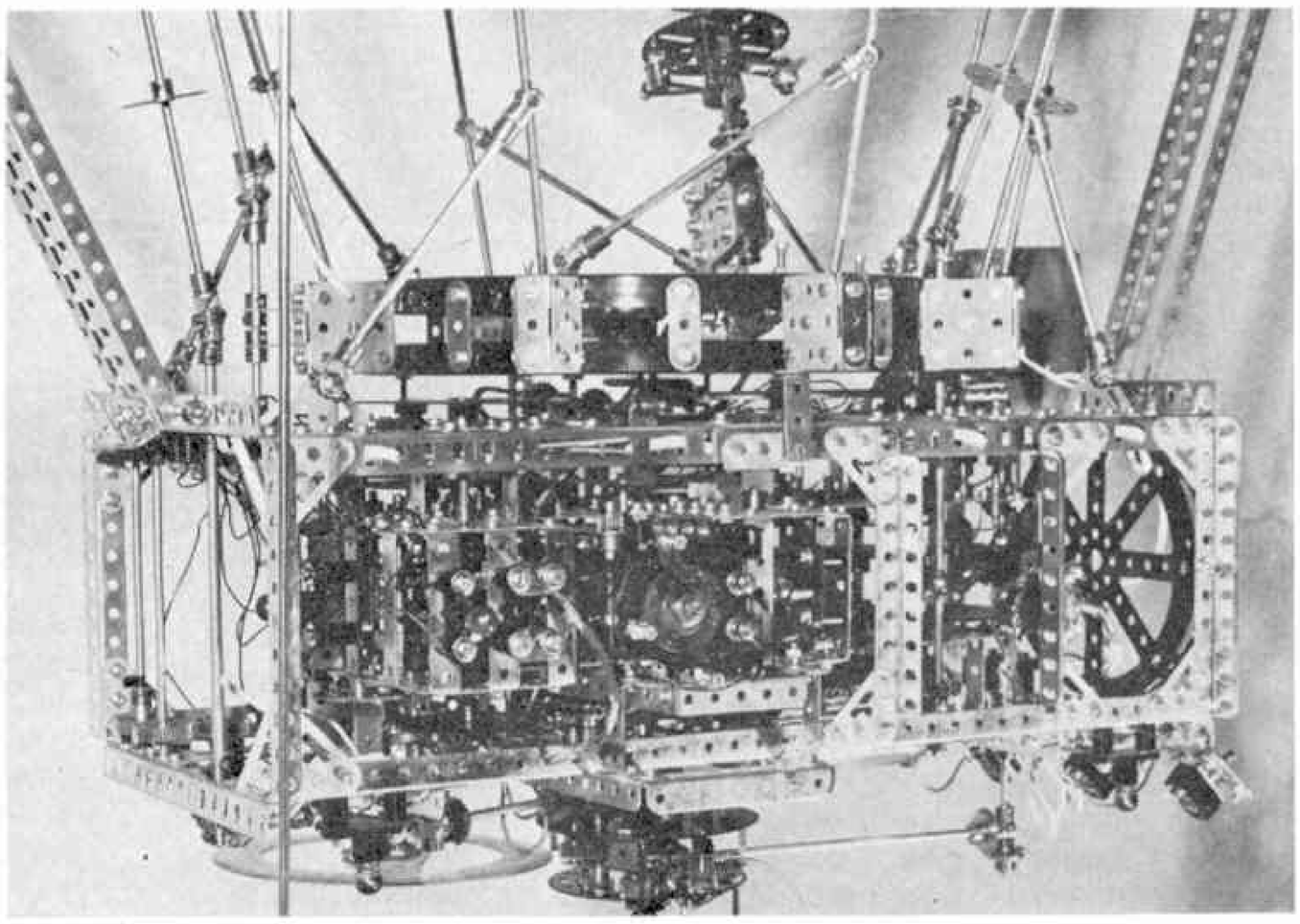
Returning to the 48:1 (12 hours) point from the motor, two other gear trains branch off here, one to spin the Earth through a 96:1 ratio with Universal Couplings via the Zodiac Ring to the Northern Hemisphere turret at the top of the model, and the other being for the Moon at a ratio of 2592:1, or 27 days from the motor. This figure, to me, was not good enough as the siderial period is 27 days 7 hours 43 mins. 11 secs. The problem was eventually solved by incorporating another differential, with another subsidiary gear train to control one of the half-shafts, which gave me an additional 7 hours 42 mins. $51\frac{3}{7}$ secs. Thus, after every twelve lunations, 1 deg. must be subtracted. The synodic period, however, automatically takes care of itself with excess of 2 days 5 hrs. 1 min. approx. on the Zodiac Ring.

The Moon's path is inclined at 5 deg. to the ecliptic, i.e. the Sun's path, which means that the Moon in its orbit round the Earth has to cross the Sun's path at two opposite points, these crossing points being called the "nodes". The nodes take approximately $18\frac{1}{2}$ years to regress right round the ecliptic, the nearest ratio without using a differential being $7 \times 4 \times \frac{2}{3}$ which equals $18\frac{2}{3}$:1.

Because of the Moon being inclined to the ecliptic, and with the nodes regressing round the Sun's path, a tidal effect is had on the Earth, causing the celestial poles to give a small nodding motion. This is achieved on the model by eccentrics in the Northern and Southern Hemispheres driven from the $19\frac{2}{3}$:1 ratio ($654{,}524\frac{2}{9}$:1 from the motor), the nodding motion being called "nutation". The nutation cycle does in fact take $18\frac{2}{3}$ years so $18\frac{2}{3}$:1 could not have been more welcome! As the actual regressing of the Moon's nodes takes $18\frac{1}{2}$ years, however, 3 deg. must be deducted from the regressing after each $18\frac{2}{3}$ year cycle.

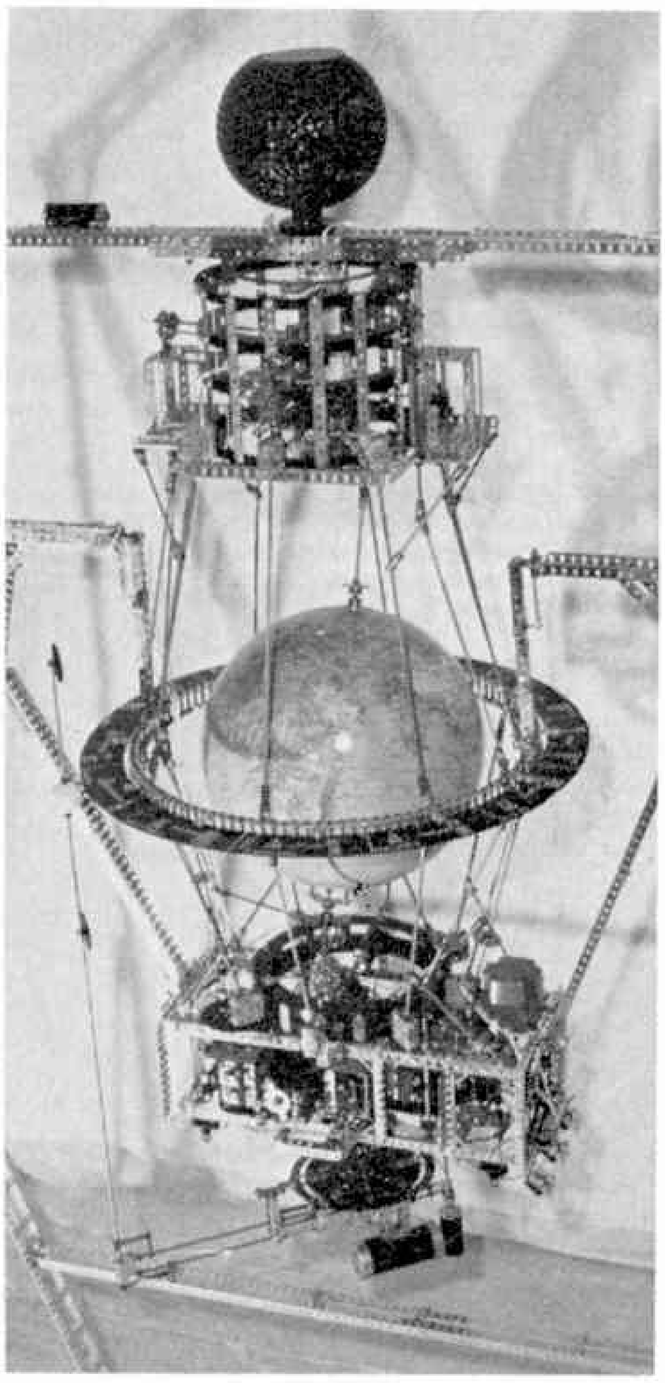
The regressing plate hangs beneath the main gearbox control unit. It will be noticed from the photographs that the arm carrying the Moon revolves round the regressing plate in an easterly direction (anticlockwise looking from the top), while the plate opposes the direction of the Moon and revolves westwards so that, after every sidereal month, the Moon's nodes fall westward by $1\frac{1}{2}$ deg. approximately.

(*continued on page* 608)



Above, a close-up view of the gearbox control unit—a maze of gears, wires and coloured lights!

Below, general view of the model showing star globe, solar turntable, Northern Hemisphere unit and Zodiac ring. Note the markings on the ring which is made up from 25 Curved Strips, Part No. 89, and 120 Bolts, each space between the Bolts equalling 3°.



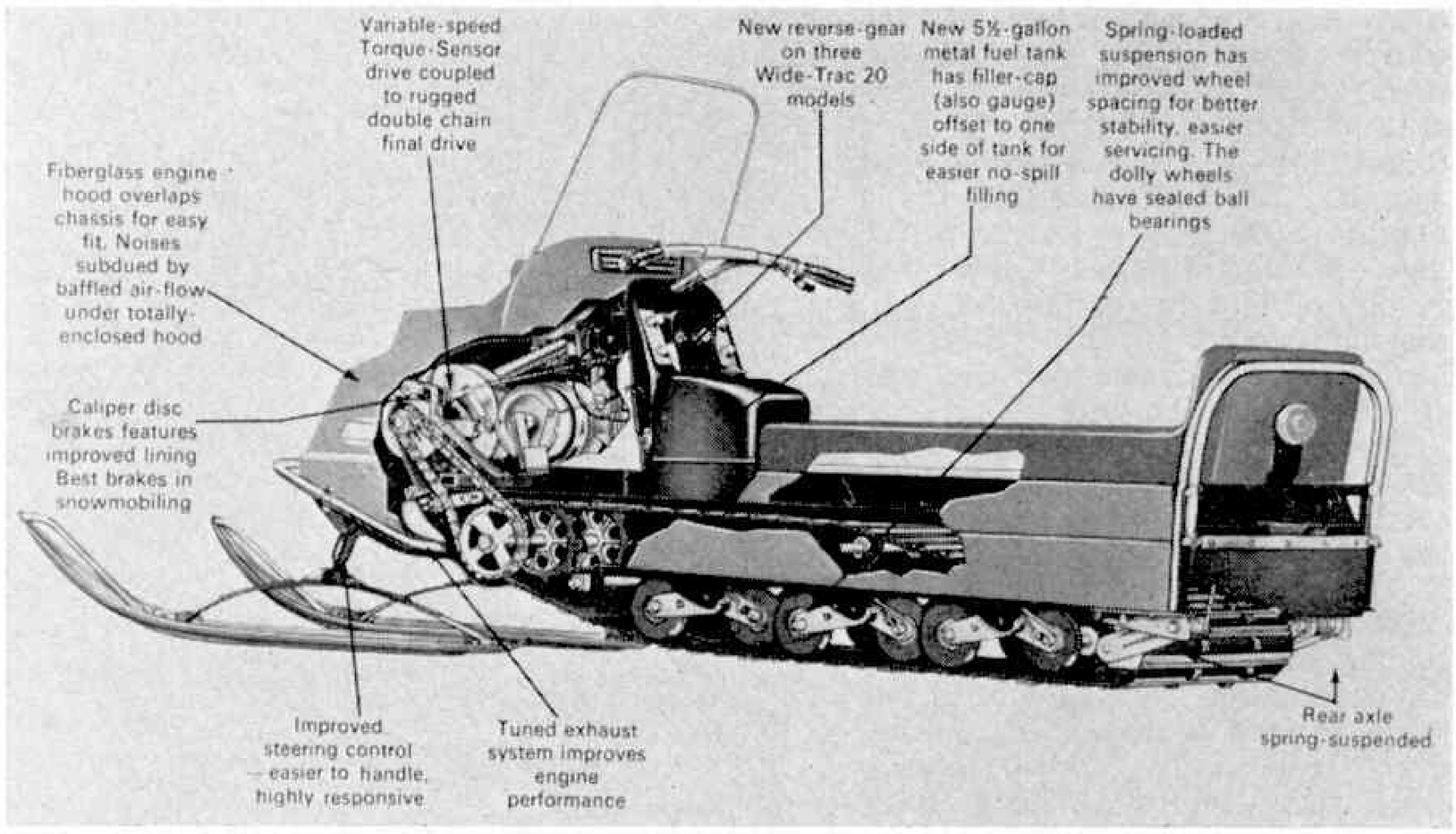
Opposite page, left, the author at work on the Tellurion described in this article. Note the two girder steadies swung out from the frame to hold the gearbox while adjustments are made.

Opposite page, right, a full general view of the model showing its strong girder-built supporting framework. The girders have been swung away from the gearbox to permit the moon to revolve round the Zodiac ring.

Snow, marsh, permafrost, and muskeg are just four surfaces that these modern machines take in their stride.

By

D. S. C. Fraser


Variable-speed Torque-Sensor drive coupled to rugged double chain final drive
New reverse-gear on three Wide-Trac 20 models
New 5½-gallon metal fuel tank has filler-cap (also gauge) offset to one side of tank for easier no-spill filling
Spring-loaded suspension has improved wheel spacing for better stability, easier servicing. The dolly wheels have sealed ball bearings
Fiberglass engine hood overlaps chassis for easy fit. Noises subdued by baffled air-flow under totally-enclosed hood
Caliper disc brakes features improved lining Best brakes in snowmobiling
Improved steering control — easier to handle, highly responsive
Tuned exhaust system improves engine performance
Rear axle spring-suspended

The Canadian Snowmobile

WITH the arrival of the Canadian snowmobile, the ultimate status symbol of the far north—a komatik drawn by a team of pure-bred huskies—has passed. That silent, snow-clad world described by Robert W. Service and Jack London has lost something of its romance forever. No longer does man venture out on the Arctic wastes into the fringe of nothing on snowshoes and dog sled. Today, only the tracks of ski-guided vehicles are scarring the white perfection of the virgin snow. All old-time forms of transport have been superseded by the faster, and more economical, snowmobile. Even the Royal Canadian Mounted Police have become mechanised.

Strangely enough, the name snowmobile is something of a misnomer. While they were originally designed and perfected exclusively for operation in snow-covered regions, and all kinds of cold weather abuses, they are now, in reality, a 'go-anywhere' piece of transport operating successfully from the frozen north to the humid swamps of South America. The snowmobile is a very versatile tracked vehicle which, with few modifications, can be made adaptable for many difficult types of terrain.

Credit for the invention of the snowmobile goes to the late Joseph Armand Bombadier, a Canadian from the Province of Quebec. He was known as the 'indomitable snowman', and ultimately, he was able to do more about snow than even the Eskimos. In his youth, winter was a sentence of imprisonment. There were places to go, but one couldn't get there over the snow-choked roads. Later, it was a snow-caused tragedy that brought about the development of the first snowmobile. One of his sons, stricken with appendicitis, died because the roads of rural Quebec were blocked by waist-high snow, preventing access to medical attention. From that tragic day, Bombadier vowed to perfect a vehicle that would traverse all kinds of snow. He did. First, a 10-passenger Bombadier snowmobile and then a lightweight one and a two-passenger 'Ski-Doo' snowmobile. The latter has now become the nation's most popular fun snowmobile but also serves many other purposes.

Fun, work, mercy and consolation are but a few of the things that the snowmobile has given to a land locked by winter. Ski-jorring is one, a nippy entertainment involving several skiers towed at high speed; Eskimo hunters use them in their arduous forays after game; the R.C.M.P. Ski-Doo their patrols; Northern missionaries 'bombardeer' to their remote and scattered parishioners; doctors in isolated and snowbound areas use the fleet little yellow machines to make sick calls that would be otherwise impossible.

The prototype of the snowmobile, with its sprocket-and-track assembly and floating suspension, was built by Bombadier. The Canadian army provided the answer, shortly after the outbreak of World War II, of widening the scope for this vehicle. They wanted a light armoured machine that could be used on snow. The 'Penguin' was the result, a vehicle that sloshed its

Picknicking in the snow was never possible before the arrival of the snowmobile. The model shown here is the Snow Cruiser, a competitor of the Bombadier Ski-Doo.

way through the campaign in the coastal marshes in Holland.

Meanwhile, the demand blizzarded nearer home. The word had leaked out that the Bombadier snowmobile was a very effective piece of equipment—especially on snow. An enclosed cabin on tracks, the early models carried up to ten passengers; today's machines transport 15 persons, including school children in isolated areas, loggers oil crews, etc.

In 1951, Bombadier brought out his Chrysler-powered Muskeg tractor, a roughneck that is in its element in snow, marsh, spongy permafrost or treacherous muskeg. The Muskeg tractor went to the South Pole with Sir Vivian Fuchs on his famed 1962–63 expedition to the Antarctic wastes. In 1968, the four-man Plaisted Polar Expedition snowmobiled over the Polar Ice Cap to reach the North Pole, despite cold, pressure ridges and open water. The machines scaled 40-foot-high ice pressure ridges and jumped 10-foot open leads of water. Only once before, when Admiral Robert Peary did it on dogsled in 1909, had men traversed the Polar Ice Cap by any method to the Pole.

There have been few innovations in recent years that have had such an impact on the winter ways of people in North America as the snowmobile. Today, nearly 60 different companies manufacture more than 150 models of snow-mobiles, and more than a million are snarling over snow-covered fields and woodlands.

Construction details of some of the popular models are very similar. Anything as useful, and popular, as the original line of Bombadier snowmobiles became, was bound to attract a number of imitators. So today, with the broadening scope of snowmobile uses and the growing sophistication of buyers, most of Bombadier's construction techniques are reflected in the many various manufacturer's vehicles.

Bombadier's Ski-Doo comes in four distinct body stylings in 12 different models. Other manufacturers are close on their trail but with fewer models. The basic features which have been preserved in the Ski-Doo snowmobile, which have showed the way for other makes, include the track and track suspensions, steel skis with leaf springs, variable speed transmission, and light engines. It was only with the availability of light-weight engines that mass production of the snowmobile became practical. The correct secret of keeping a snowmobile afloat is the proper ratio of power to weight.

The average weight of a two-seater snowmbobile runs around 325 lbs. Tracks, which vary in width from 15 inches to 18 inches, are covered with moistureproof rubber, over heat-hardened steel cleats. This type of track insures positive traction under all snow conditions.

Most of the engines are designed especially for snow-mobile use. Specifications range from 227 cc (12.5 hp) to a 669 cc alternating vertical twin cylinder engine developing 45 hp at 6500 rpm. The latter type of powerhouse models are used chiefly for racing snow-mobiles—a fast-growing new sport in North America.

In the highly competitive production field of the snowmobile everything is engineered to as near perfection as possible. Most models, for instance, have a tilt-forward cab, so engine parts can be easily reached for simple tuning and fast servicing. The overall length of a snowmobile varies between 93 inches and 111 inches (with skis), width 29 inches to 35 inches, weight 285 lbs. to 513 lbs., bearing area 1135 sq. ins. to 1830 sq. ins., ground pressure 25 lb/sq. in. to 30 lb/sq. in. Chassis and cowl are usually made in one piece, all steel with reinforced glass fibre; the length of the track on the ground is 50 inches. This is supported by from 14 to 28 rubber bogey wheels, drive sprocket, and tandem and torsion springs for suspension.

Controls on a snowmobile are relatively simple. Brakes, which are sometimes pivoting shoe brakes or the disc and floating caliper, self-adjusting type, are hand operated on the steering handle together with the throttle. There is a one-piece rust-resistant cable housing on the throttle and brake lines. The nylon interiors stay frost-free even in sub-zero temperatures.

An additional unique feature embodied in most snow-mobiles is a cam-action torque converter. This satin-smooth device automatically delivers the perfect torque at every speed. A stronger, friction-free pulley makes it virtually trouble-tree. Quieter performance is usually accomplished with specially designed exhaust systems. Some manufacturers put a premium on quiet operation by completely enclosing the engine under an insulated automotive-type hood, together with sound baffles and improved muffler systems. Early snow mobiles were inclined to be noisy. Seating is an important factor in the snowmobile. A rider must be protected against a 'bumpy' ride in some circumstances and, also, cushioned to take a severe jolt after making a jump, which is often necessary in hilly areas. To offset against these contingencies, ribbed seats are constructed of sturdy Arctic-tested vinyl over double layers of airfoam. This absorbs shocks for a safer more comfortable ride. Add the usual automatic starter,

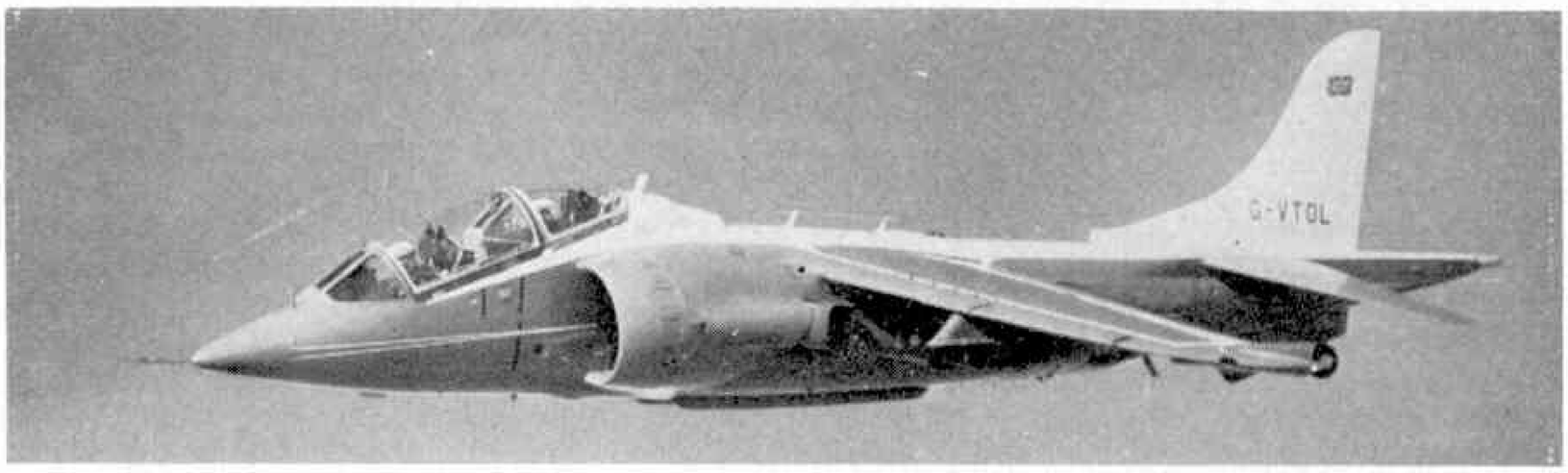
(*continued on page* 606)

Above: Getting machines and sleds over ice blocks and ridges of Arctic Ice Cap was no easy job for the Plaisted Polar Expedition to the North Pole in 1968. Here two members struggle to get a loaded sled in position to "top" a ridge.

Below: The Ski-Doo, Nordic Model, has a 371 cc engine and an 18 inch track. Note tilt-forward engine cowl, sound-muffling exhaust, drum brakes, hinged petrol cap and fuel gauge, lift-off dash, cigarette lighter, electric starter, speedometer and tachometer.

AIR NEWS

BY JOHN W. R. TAYLOR



First with Pumas

When No. 33 Squadron of the Royal Air Force reformed officially this year, it became the first British combat unit to operate aircraft built under the Anglo-French helicopter agreement signed in 1968. Three types of helicopter are being manufactured jointly by Westland in the U.K. and Aérospatiale in France. Largest of these is the Puma, a twin-engined transport which was developed initially by the French company, under the designation SA 330, for military assault duties by day or night in all weathers. Forty have been ordered for the R.A.F., as Puma HC Mk. 1s, and the first of these have gone to No. 33 Squadron.

Maximum cruising speed of the Puma is 169 m.p.h. This may not seem very fast in a jet age, but the first aircraft flown by No. 33 cruised at under 100 m.p.h. The date was January 1916; main task of the Squadron was to defend Leeds and Sheffield, two important munition-producing centres, against attacks by German Zeppelin airships. Its first commanding officer was Major (later Air Chief Marshal Sir) Philip Joubert de la Ferté, who had flown a Blériot XI monoplane on the first reconnaissance sortie over enemy territory on August 19th, 1914.

No. 33 did not shoot down any enemy aircraft in the first World War, although it prevented the success of several German bombing raids. Like many other units, it was disbanded in 1919. Ten years later it reformed as a bomber Squadron at Netheravon, with Hawker Horsleys. These were the last of a generation of big lumbering biplanes. After a year No. 33 became the first R.A.F. Squadron to fly Hawker Harts—finely streamlined two-seat bombers with Rolls-Royce Kestrel engines that set the fashion for R.A.F. fighter and bomber design for several years.

In 1935 the Squadron took its Harts to India but, by 1938, had been transferred to Ismailia, Egypt, equipped with the Gloster Gladiator, last of the R.A.F.'s biplane fighters. The change of role was to last for a quarter of a century. During the second World War No. 33 flew Hurricanes over the Western Desert and Greece, and then Spitfires, Typhoons and Tempests from Britain and from airfields in Europe after the D-Day invasion of France. In all, its pilots shot down 291 enemy aeroplanes and destroyed or damaged another 37 on the ground.

Eight years after the war No. 33 went East again with twin-engined Hornet fighters, this time to Butterworth in Malaya. It amalgamated for a time with 45 Squadron, but was reformed in the U.K. in 1955 when it began to fly Venom NF Mk. 2 all-weather jet fighters from Driffield in Yorkshire. After a further brief period of disbandment, No. 33 reappeared when its number was given to the former No. 264 Squadron. The Meteor NF Mk. 14s that it inherited were replaced with Javelins in 1958 and it continued flying these big all-weather deltas until the end of 1962.

When No. 33 next reformed, three years later, it was given a very different kind of job. Based again in Malaya, its piloted aeroplanes gave way to surface-to-air missiles. With the number of first-line squadrons of manned aircraft drastically reduced in the modern RAF, the possibility of ever getting its personnel airborne again must have seemed remote. It is, therefore, a pleasant surprise to see the Squadron's hart's head badge painted on the side of the flight deck of the first RAF Pumas.

Powered by two 1,328 h.p. Turboméca Turmo IIIC4 turboshaft engines, the Puma is equipped normally to carry a crew of two or three and 16 troops. In an ambulance role it can accommodate six stretcher patients and four seated casualties or attendants; alternatively it can carry freight inside its cabin, or up to 5,510 lb. in a cargo sling under its fuselage. The RAF version is fitted with a rescue hoist and an abseiling beam by which the troops can lower themselves quickly to the ground while the helicopter is hovering.

The four-blade main rotor has a diameter of 49 ft. 2½ in. and the fuselage is 46 ft. 1½ in. long. Maximum take-off weight is 14,110 lb. and the Puma will fly 385 miles at 157 m.p.h. with full fuel. It is able to be armed with a sideways-firing 20 mm. cannon, machine-guns and missiles, and differs from most earlier helicopters in having a retractable undercarriage. As well as serving with the RAF and French Army, it has been exported to Algeria, the Congo, the Ivory Coast, Portugal and South Africa.

G-VTOL

Until about three years ago British civil aircraft registrations were allocated in very strict alphabetical order. Then, when the French gave Concorde 001 the special registration F-WTSS (standing for Transport Super-Sonique), it was decided to bend the rules and allow BAC to register Concorde 002 as G-BSST (British SuperSonic Transport).

It was hardly to be expected that other manufacturers would miss the opportunity of getting "personalised" registrations for their aircraft. Nobody was surprised, therefore, when the Hawker Siddeley Harrier XV742 was disguised with the civil identity G-VSTO (Vertical and Short Take-Off) during its demonstration flights in Switzerland last June. It has now been followed by a two-seat Harrier bearing the equally appropriate registration G-VTOL (Vertical Take-Off and Landing). Conveniently forgetting G-VSTO's temporary civilian guise, Hawker Siddeley describe G-VTOL as "the world's first civil fixed-wing V/STOL jet aircraft".

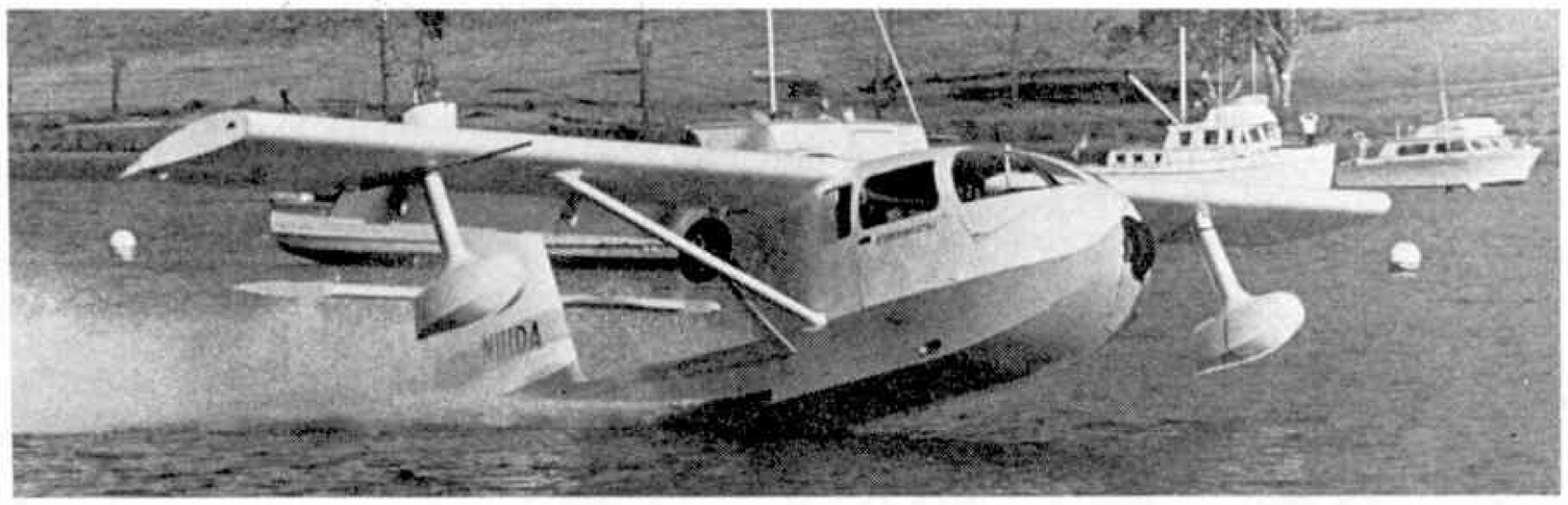
Had such permissiveness existed earlier, Cierva's Air Horse helicopter would, presumably, have been G-GEEE. We must now wait and see if the registration authorities will allow some young owner of a racing 'plane to have the letters G-WHIZ!

Not What It Seems

Keen spotters among our readers can be excused if they take a quick look at the little amphibian shown in the photograph on this page and decide that it is a Republic Seabee. Although this aircraft has been out of production for nearly 25 years, there were still about 200 Seabees in service at the last count, mainly in North and South America.

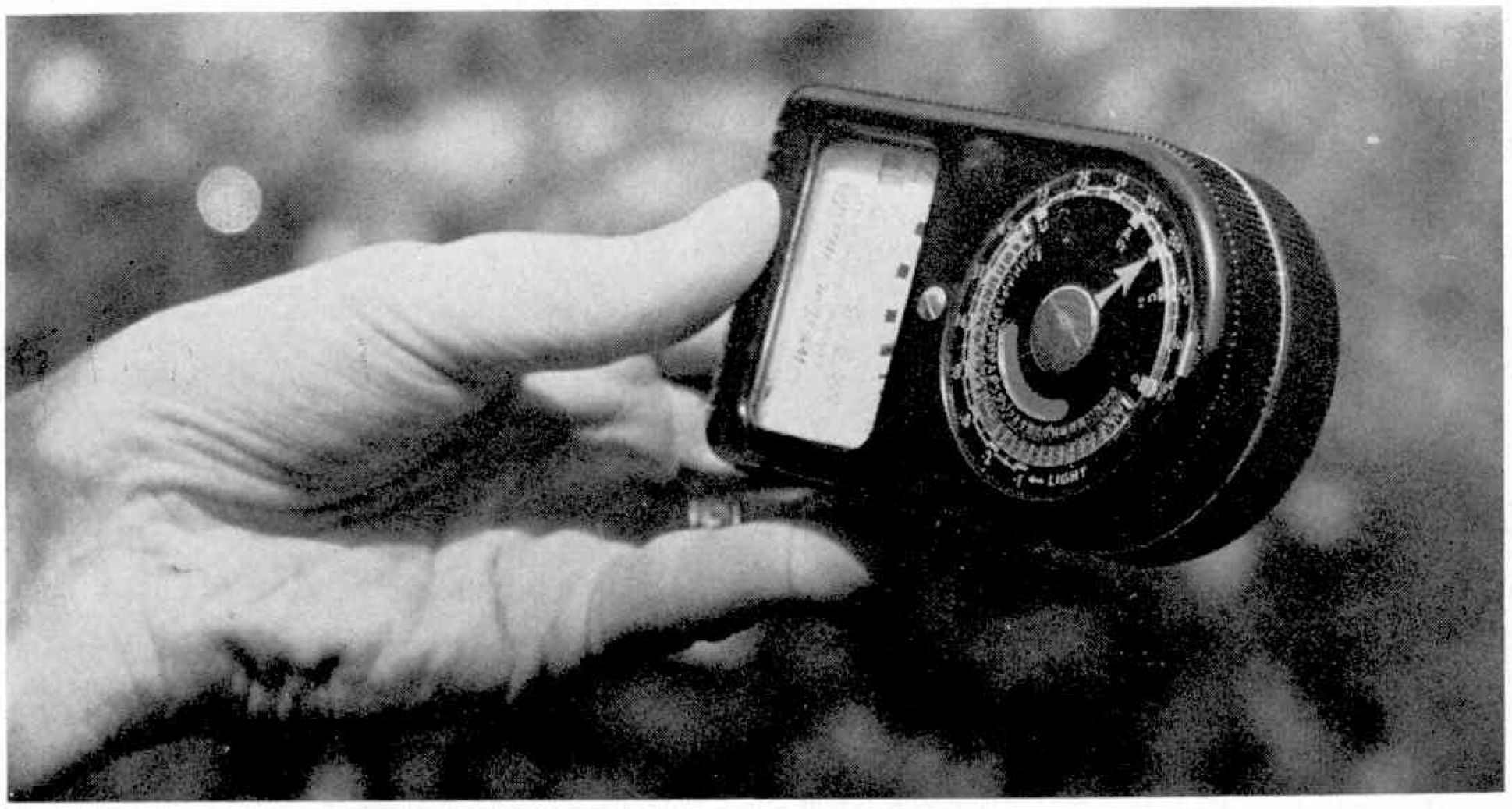
However, N111DA is not a Seabee. Its history dates back to 1930, when an American designer named P. H. Spencer worked on the Privateer amphibian manufactured by Amphibians Inc. of Garden City, New York. It was followed in 1937 by the Spencer-Larsen, then the Spencer Air Car S-12, and in 1944–47 by a total of 1,060 Republic Seabees. All of these were variants of Mr Spencer's basic Air Car configuration, as a result of which he received royalties on the Seabees.

A similar type of aircraft, known as the Trident, is being developed now in Vancouver, Canada, as a production amphibian. Mr Spencer's own latest designs, the 180 h.p. S-12-C Air Car and 260 h.p. S-12-D, are intended for construction at home by amateurs, and at least 15 "Ds" are being built. These are four-seaters with a wing span of 37 ft. 4 in., length of 26 ft. and take-off weight of 3,100 lb. A 260 h.p. Lycoming O-540 engine gives a top speed of 147 m.p.h. and range of 700 miles at 135 m.p.h. Construction is mainly of wood, with a welded steel-tube structure to carry the wings, engine and undercarriage, and some glass-fibre parts, such as cowlings, fairings and under-wing floats, which serve also as auxiliary fuel tanks.



N111DA, the Spencer Air Car S-12, is so like the Republic Seabee of the late 1940's that spotters jumping to the wrong conclusions can readily be excused. Note the positions of the wheels when 'up'—one can hardly say 'retracted'!

Opposite page Above: Two Puma HC Mk. 1's serving with the newly formed No. 33 Squadron. Centre: The Hawker Siddeley Aviation's fixed wing V/STOL jet aircraft on its maiden flight. Below: Hawker Harts were first used by No. 33 Squadron.



FIRST SELECT YOUR FILM

"Photography is Easy" Part 2. By Peter Wilkes

TO many people a visit to a camera shop to purchase a film for the camera can be a daunting experience.

Confronted by row upon row of different coloured boxes, each seemingly containing an entirely different film, the simple photographic processes seem to have become related to black magic or belonging to long bearded scientists.

Yet there is really nothing difficult about film selection, and, by knowing which film to ask for, and suiting its characteristics to the photographic work that you want to undertake, results will improve from any assignment you may care to tackle.

The first point to remember in film selection is that all films are graded according to the speed of the emulsion, or, in other words, the sensitivity of that emulsion to light. In England the speed is indicated in ASA. This method of indicating film speeds was developed during the last war by the American and English workers and is now the basis of the ASA and BSI standards.

For all general purposes, monochrome films are available at ASA ratings from as little as 20 to over 2,000. From very slow or with light sensitivity to light, to those that are, according to some, so fast they they will photograph a black cat in a coal cellar.

Taking the figures given above, 20 to 2,000, you will realise that one is nearly 100 times faster, or more sensitive, than the other.

Confusion arises when the normal camera user is presented with these figures on a visit to purchase a "film for the camera". Why, he asks, are such differences required? The manufacturers, by the process of making available such a range of films, have simplified photography for you by giving a film for any task you may care to undertake.

For general purposes films are graded into three classes-

Slow. Medium. Fast.

Slow films are used in circumstances of bright light; medium speed ones as a general purpose film for all normal photography, and the fast ones for photography under bad light conditions, or when a fast shutter speed is needed together with a small "f" number, as when photographing fast moving racing cars, when the fast shutter speed is needed to stop action, and the small "f" number to give a good depth of field.

For all round shooting the medium speed films are sensitive enough to be used with even the simplest cameras, under all conditions of outside light that the normal photographer is likely to encounter.

However, if you are going to spend a holiday on a beach under the blue skies of summer, or under conditions of bright sunlight and snow, the slow films will make the most of the situation and ensure that you are able to use the combination of speeds and "f" numbers of the camera to maximum effect.

If you intend to use your camera for such purposes as catching the expressions of people in indoor conditions, such as amusement arcades at seaside resorts, in cafes and other public places, or stopping the fast action of racing cars and motor cycles, then the fast film is the one you will choose.

Speed however, is not the only consideration in choosing a film, for, related to speed, is the grain structure of the film. To make a film very sensitive to light manufacturers have to make the emulsion of larger light sensitive "grains" so that it reacts more quickly. This means that, in enlargements, the grain particles, in a fast film, show up at smaller degrees of enlargement than they do on a medium or slow film.

So it can be said that a fast film permits a smaller degree of enlargement of the print to keep the same quality as would be expected from a medium speed film. In practice, up to a size 10″ × 8″ from the whole of a 35 mm negative, this does not show up to too great a handicap, but anyone who wishes to see his "masterpiece" blown up to a massive 20″ × 16″ has to keep the problem of grain in mind.

For normal purposes the middle of the road is the best path to take, with a medium speed film rated at 125 ASA in the camera, but keeping in mind that, for those other jobs, the fast and slow films are available to aid you.

Opposite, showing the way a meter is held for "landscape photography". When held in this manner, pointing slightly downward, the reading is not influenced greatly by the light tones of the sky. Above, incident light reading. The meter in this case is a Weston Master and is shown with the incident light attachment fitted over the cell. Meter is pointed from the subject position to camera. Below, two essentials that are playing an increasing part in the finding of correct exposure, the exposure meter and a "grey card". Used as described in the text, the "grey card" system will guarantee correct exposure every time.

The one subject that cannot be isolated from films is exposure. Although modern films have a built-in exposure latitude, the ultimate in results can only be obtained if the film material is given the correct exposure.

Many amateur photographers who have relied on the instruction sheets enclosed with the films for exposure details, eventually purchase an exposure meter but, contrary to finding their problems at an end, find they are just beginning. Without doubt, for correct exposure under all circumstances, an exposure meter is essential but, like other mechanical aids, it cannot think for itself and requires the guidance of a human hand. It is in giving this guidance that so many people find difficulties.

There are two ways to make an exposure by means of an exposure meter—by REFLECTED LIGHT and by INCIDENT LIGHT. In the first case the meter is held at the camera position and pointed at the subject, and for the incident light method the meter is taken to the subject and pointed at the camera position.

If the meter is held at the camera position and pointed at the subject it must measure the LIGHT REFLECTED FROM THE SUBJECT, while if held at the subject position and pointed at the camera, it measures THE LIGHT FALLING ON THE SUBJECT.

A REFLECTED LIGHT READING is the average of the light reflected from the scene, the sky, the dark eyes of the subject, the green of the lawn, and the skin tones of faces. With such a subject, classed as the "average subject", the meter's sensitive cell integrates the differing brightnesses from the variou sparts of the scene and gives you a reading corrected for the subject as a whole.

For an average subject, a reflected light reading will give an accurate exposure, but for subjects that are not average, which contain large areas of dark tones or of light tones, then the meter requires help from the human operator.

One method of correcting a reflected light reading in a scene containing large areas of light and shade is to take a reflected light reading of both, and then use the "average" between the two readings.

In the case of a scene taken against the light, i.e. with the sun shining towards the camera, give half a stop more exposure than indicated by either reflected or incident light readings.

With INCIDENT LIGHT measurements, the system takes into account the light falling on to the subject and hence adjustment for other than average subjects is less than with reflected light readings. This method is not affected by the dark or light tones of the subject and is of particular value on colour photography, as it will always give the correct exposure for skin tones, that part of a colour photograph that must always be accurate.

On balance, it can be said that the incident light method of exposure is less open to misinterpretation than the reflected light system.

Obviously no meter can be used for both methods without alteration and for this purpose the cell of the meter is covered by a diffusing material. In some meters this comes as an accessory that clips over the cell, whereas in others a white diffusing window housed in the side of the meter slides across when incident light facilities are required.

There are certain rules of advice that can be given for correction of reflected light readings:

1. When taking a meter reading of a landscape always tilt the meter slightly towards the ground so that no more than one third of the sky is influencing the meter cell, otherwise the reading will be too high and the foreground under-exposed.
2. In taking photographs of people, especially if the skin tones are contrasted against a dark or very light background, move in close with the meter so that only the skin tones are measured.

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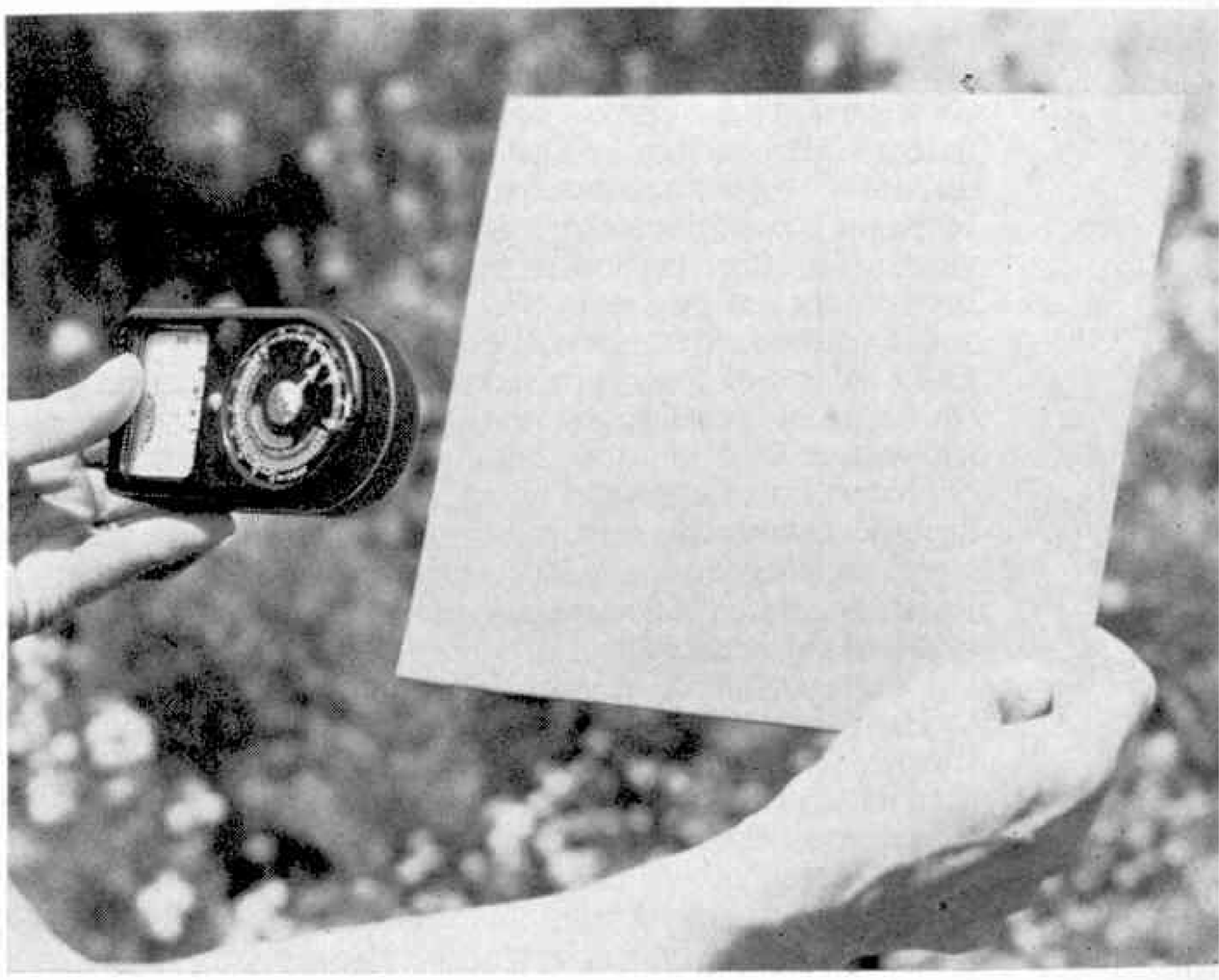


STAMPS

PAPUAN CUSTOMS and PEOPLE

BY J. A. MACKAY

THE colourful peoples of Papua–New Guinea have long been a powerful selling point for the stamps of that country. The Papuan definitive series of 1932, one of the first from any Commonwealth country to adopt a frankly pictorial approach, established this precedent, with pictures of native mothers and children, Motuan belles and Papuan dandies, warriors, fishermen, masked dancers and even policemen! Since the Second World War the people, their costumes, picturesque way of life and folklore have provided the subjects for numerous stamps.

In 1964 the Papuan postal administration began issuing regular sets of stamps devoted to the theme of the country's cultural heritage. The first set consisted of four stamps featuring dancers' masks from different districts. The following year distinctive canoe prows from the Sepik District were shown on a series of stamps to publicise exhibits in the Port Moresby Museum. In 1966 characters from the folklore of the island were chosen. No stamps appeared in 1967 but in February 1968 there was a series depicting some of the colourful head-dress worn by warriors of different regions. The following year the set took a novel form. Two 5c and two 10c stamps were produced, with native motifs representing the art of the Elema district. The stamps were issued in vertical pairs, so that each stamp bore half of the design. The stamps in each pair were separated by a horizontal line of rouletting. A second series in the national heritage theme appeared later that year in a more orthodox format and featured musical instruments of Papua.

Since then there have been two sets each year. In 1970 the set of four released in February departed from the normal custom by including items of European interest. Two stamps depicted the map made by the explorer Torres in 1606 and HMS *Basilisk* respectively, but the remaining stamps showed a prehistoric Ambun stone carving and a Masawa canoe from Kula Cicuit. Later in the year cooking utensils and food storage bowls were featured.

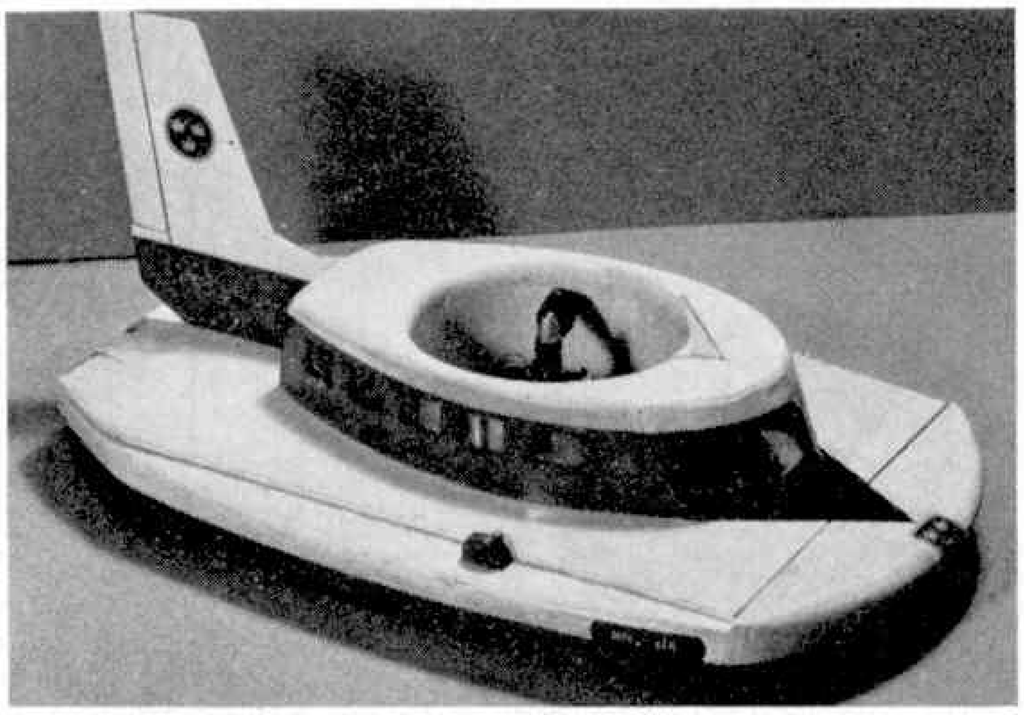
Native architecture was the theme of the series issued in February 1971, with examples of the dwellings in the Eastern Highlands, Milne Bay, Purari Delta and Sepik districts. Four stamps, for use on Christmas mail, were released on 27th October and depicted native dancers. A solo dancer from the Siaa district appeared on the 7c and a group of three Siaa dancers on the 28c. A Tubuan dancer was shown on the 9c and a pair of Tubuans on the 20c. The stamps were designed by the Australian artist, Nancy Hayes, and, like the majority of the folklore and culture stamps of previous years, printed in multicolour photogravure by Courvoiser of Switzerland.

The people of the territory, however, continue to furnish numerous subjects for their stamps. In 1969, for example, when most countries were content with a symbolic design to mark the 50th anniversary of the International Labour Organization, Papua–New Guinea featured a native potter on its 5c stamp. Last August an attractive set of four was released to publicise some of the primary industries of the island.

The 7 and 14c stamps portrayed scenes showing traditional trading methods used by local people both in the coastal and inland regions of the country. Although the barter system is rapidly being superseded by the use of coinage, the age-old system is still used among villagers in the exchange of produce for their daily needs. The 7c stamp shows a coastal villager bartering fish for coconuts and taro. The 14c depicts a typical market scene, which can be seen in any of the major towns of the territory. Here fruit such as bananas, pineapples, coconuts and papaws are bartered for meat such as pig, venison, mangani (a type of small wallaby) and snake. In the coastal towns numerous varieties of fish as well as the occasional turtle or dugong can be purchased.

The 9c and 30c stamps depict everyday scenes showing local agricultural methods. The former stamp shows a man stacking yams and taro while another climbs a tree to gather coconuts. The latter stamp features a man and his wife tending their sweet potato crop in a Highland garden.

The stamps of the territory of Papua–New Guinea since 1952 have been very popular with collectors on account of their colourful and interesting designs. Now an excellent book has been published which gives the background story to these stamps. *Franklin's Guide to the Stamps of Papua and New Guinea*, by Mark Franklin, deals not only with the issues of the combined territory since 1952, but with the separate issues of British New Guinea, German New Guinea, and the prewar territories of Papua and New Guinea. It contains more than 320 illustrations in black and white and eight pages of full colour. It is available at $3.95 direct from the Department of Posts and Telegraphs at Port Moresby, but the U.K. stockists are Vera Trinder Ltd of Bedford Street, London, W.C.2.



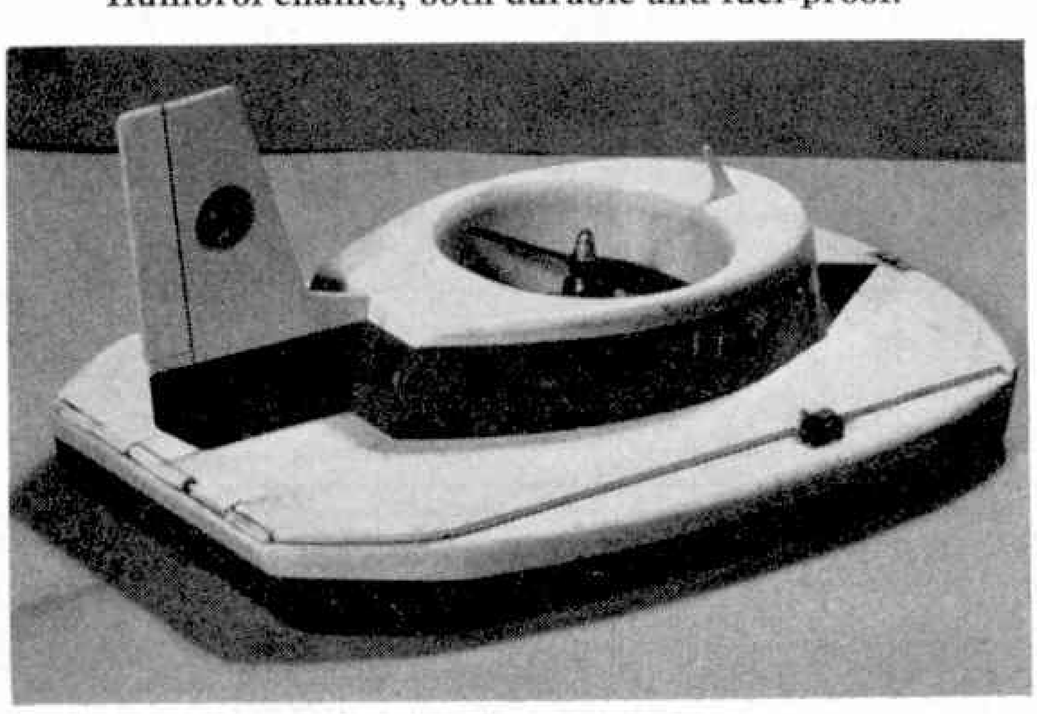
HOVASTAR

Enjoy the thrills of hoverflight with this indoor air cushion vehicle

BY RAY MALMSTROM

FULL-SIZE PLANS OVERLEAF

Top, Hovastar combines straightforward construction with plenty of eye-appeal for modern hovercraft age.
Centre, underside view shows what makes hovastar tick. When trimmed, rudder can be locked with scrap balsa blocks. Note R.T.P. bridle.
Below, original Hovastar still spick and span after dozens of flights after clear doping and Humbrol enamel, both durable and fuel-proof.

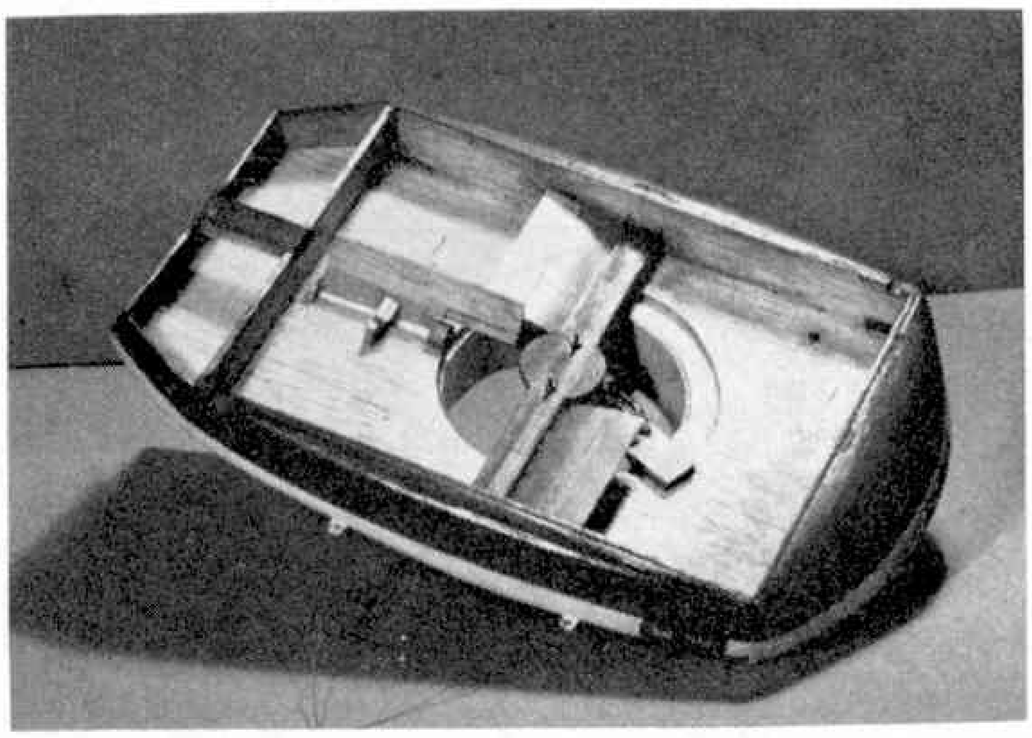


HOVERCRAFT undoubtedly have a fascination all their own. Working model hovercraft share this fascination and are among the most absorbing models to build and operate.

The intriguing little model featured here with full-size plans and constructional sketches, is powered with the easy-starting Cox .010 glo-motor, and is designed for indoor operation (no wind or weather problems!). A reasonably large room, your club hut, school hall or gym (with permission of course!) are ideal. Keen to own your very own hovercraft? Good! Then let's get together and start building.

Cut the engine mount from $\frac{1}{8}$ in. ply and drill for your Cox T.D. .010 motor. Cement the engine mount to the $\frac{3}{32}$ in. sht. sides A. Cut two anti-torque vanes (B) from very thin tin. We cut ours from air-line lightweight cigarette tins. Curve vanes as shown and Araldite or Evo-Stik them to the engine mount. Sketch 1. Complete the basic frame with front and rear panels C and D and blocks E. Note the cut-out in piece D. Check that the basic frame is true and square. Sketch 2.

Cement two 10 in. long by 3 in. wide pieces of $\frac{3}{32}$ in. sheet together. On to this trace decking piece F. To get this the right size you must join the lines Z1–Z1



together from the plan. Cut out piece F and cement accurately to the basic frame. Make a paper tube by rolling 1 in. wide gummed paper strip around a length of $\frac{3}{32}$ in. diam. dowel rod, taking care not to stick the tube to the rod—the dowel rod should be a sliding fit in the tube. Cement the tube on the rear edge of piece F. Hold it accurately in position with 3 layers of tissue paper doped on. Now add the side pieces G and H. Sketch 3. Cut two side pieces J from soft balsa, damp the *outer* surfaces, and cement to pieces G and H, holding in position until dry with modelling pins. Build the tunnel from $\frac{1}{16}$ in. sht., cement rear piece K in place, and cement tunnel in cut-outs in pieces D and K. Carve and sand to shape nose block L, hollow out and cement to the front of piece C. Sketch 4.

Cut away anti-rotation ducts in pieces H. (Starboard front, Port rear). Trace and cut out upper decking piece M, as for decking piece F, noting different rear end and also cabin slots. Decking piece M is hinged to decking piece F. The $\frac{3}{32}$ in. diam. dowel is passed through the paper tube and cemented at either end to piece M, the joins being, once again, reinforced with 3 layers of tissue paper. Check that piece M is absolutely *flat* on decking piece F and opens up easily. Finally cement $\frac{1}{8}$ in. sq. strips N to decking piece F. Study hinge-detail sketch. Check that the circular openings in both decking pieces F and M line up

Black

L

Nose Weight

Colour Line

1/16" Ply and 3/32" Sheet.

Fuel Lines Mount X

Prop. Arc.

E
2-off
1/4" sht.
and
1/32" sht.

Catch Detail

Sides J
1/16" s

1/32" Ply lugs

Y

Round-off all edges before doping and painting.

G 3/32" sht. (2)

Port Only

H 3/32" sht. (2)

1

A

B

B

Engine Mount

A

C

E

D

2

G

H

3

Thin thread bridle

T

Cabin top
1/8" sht.

Slot

1/16" Ply

Z

Colour Line

Colour Line

Thin acetate windscreen

Cox T.D. 010
Glo - Motor

L Soft Block

Colour Line

C

1/8" Dia. Neoprene Fuel-Tubing

3/32" Dowel

Line Ducts with thin card

H

Trace all parts from plan and transfer to Balsa or Ply wood.

U

3/32" Sht.

S

ides J
/16" sht.

Paper tube 3/32" Dia. Dowel Rod.

C/L

3 Layers tissue, silk, or Nylon.

Hinge Detail

N

N

B

Anti-torque vanes (2). Thin tin.

9.1/2" Trim to fit.

1.1/2"

Y

1/4" sht.

V

Fin 1/16" sht.

B

Cut away after assembly

Air intake duct

5

K

J

4

Tunnel

Cut Out

Cabin Sides

Sheet Join

Ball-point pen

Engine mount 1/8" Ply

Cut

R

1/16" Sht. (2)

U

B1

Decking Piece M

Rudder Mounts

Thin Cellophane For Windows

wel

Rudder Mounts 1/4" and 1/8"

3 Layers Tissue

D

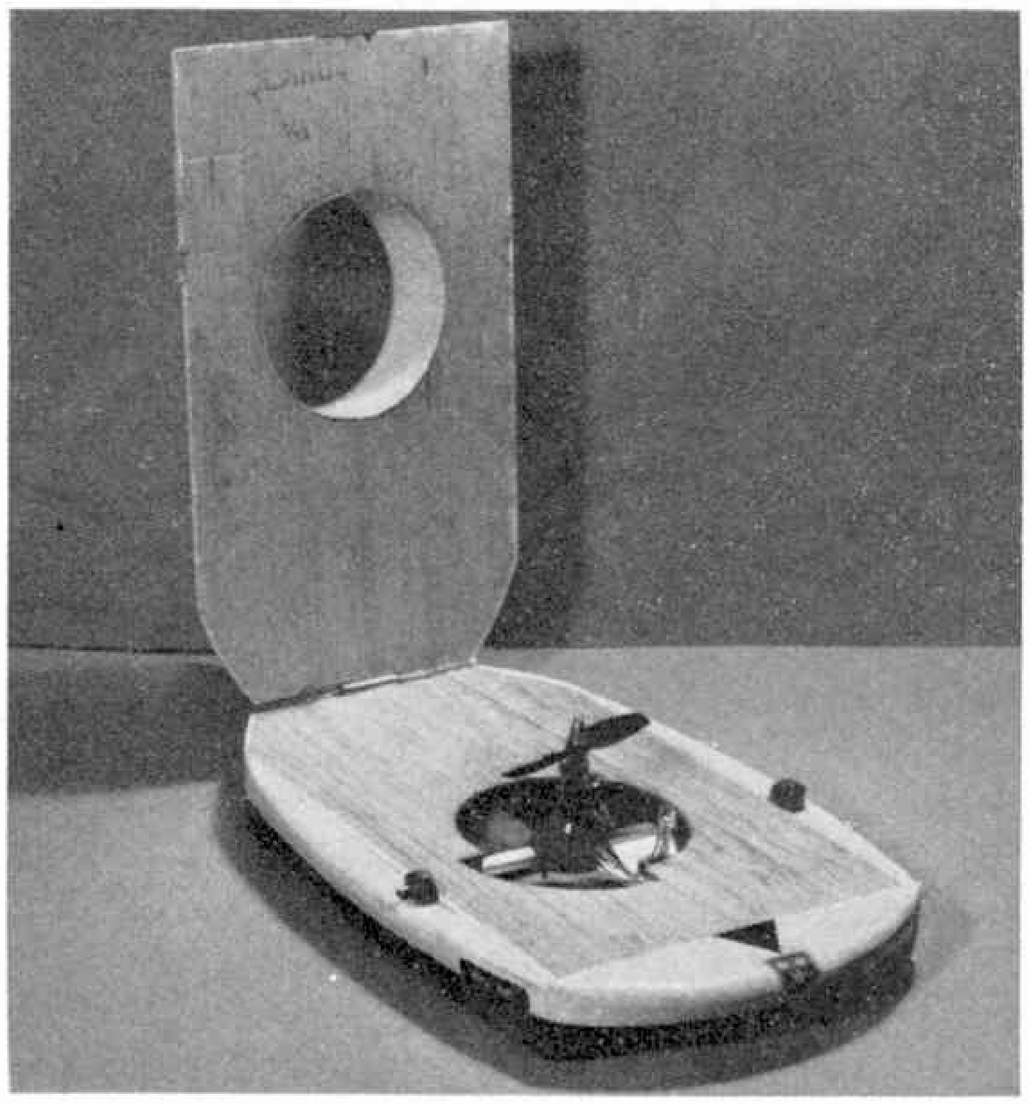
Decking Piece F

Tunnel 1/16" Sht.

K

Anti-Rotation Ducts

10



Top decking opens up for easy access. Starting and adjusting motor no problem. Lock decking down before launching.

correctly. Now construct the main air intake duct. Cut a strip of $\frac{1}{16}$ in. sht. (noting grain direction) to the dimensions shown. Soak in water and wrap around a tin roughly 3 in. diam. Hold in position with rubber bands until dry. Do not cement the join. Slide off the tin and test fit the duct into the opening in decking piece M. When a correct fit, cement the duct join and cement the duct accurately into the opening.

Cut out two cabin sides, cut out the windows and cover them from the inside with thin cellophane. Cement cabin sides into slots in decking piece M. Please see that the bottom of the tabs are flush with the underside of piece M. Sand them flush, they must not protrude. Sketch 5. Cement cabin support pieces 5 in position and fit rear cabin piece V. Cut and fit cabin top T. Add fin, and catch pieces V with $\frac{1}{8}$ in. diam. locking dowels. When in the closed position catches must keep decking piece M and cabin assembly flat against decking piece F. Sketch 6.

Turn model over. Cut out rudder W and cement a length of $\frac{3}{32}$ in. diam. dowel rod to top of rudder, reinforcing with 3 layers of tissue paper. Cut out and put rudder mounts on ends of dowel rod, they must be a tight fit. Cement rudder assembly to underside of decking piece F. Build the fuel-line mount piece X from $\frac{1}{16}$ in. ply laminated to $\frac{3}{32}$ in. balsa sheet. Drill holes for $\frac{1}{8}$ in. diam. neoprene fuel tubing. Cement piece X in position on underside of piece F. Sketch 7. Cut the windscreen from thin acetate or cellulose sheet. Hold in place with modelling pins until set. Cut two lugs Y from $\frac{1}{32}$ in. ply. Drill a small hole in each and cement in slots cut in decking piece F. Make the round-the-pole bridle from thin thread. Cement wireless mast Z in place. Sketch 8.

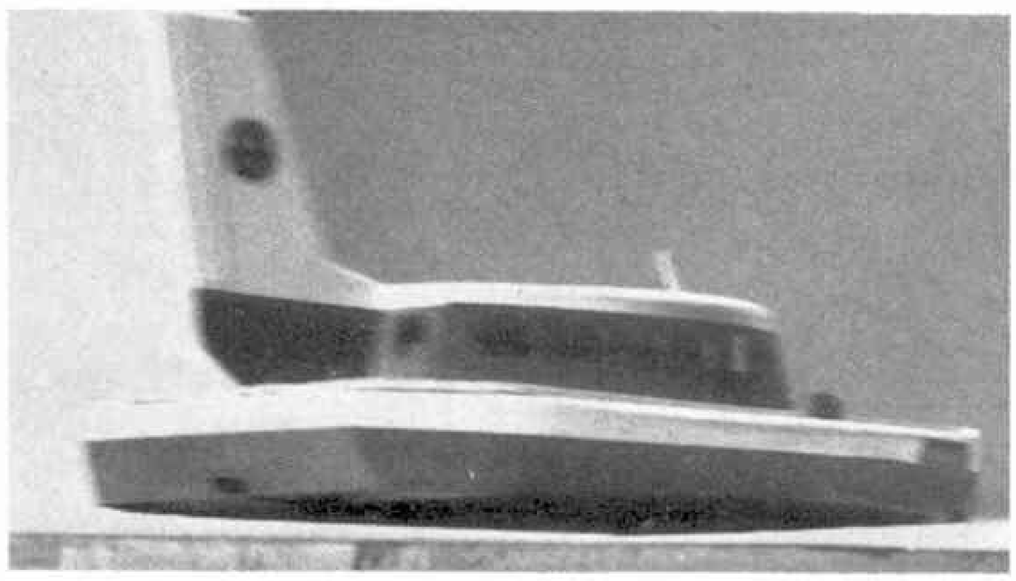
Give entire model two coats of clear dope, lightly sanding between coats. Fuel proof engine mount and cemented joints likely to come in contact with glo-fuel. We used Humbrol enamel, which in addition to giving an attractive finish, is also hot-fuel-proof. We choose white for the top surfaces and top of fin, red for the cabin sides and lower part of fin, and grey for the lower part of the sides. Catches grey. All that remains is to bolt in the engine and put small lengths of neoprene fuel tubing (from your model shop) between mount X and the engine tank.

Balancing and trimming your hovercraft is all-important for successful flight. Suspend the model from a length of thread tied to the propeller retaining nut. Add a small piece of lead or folded empty cement tube in the nose block (see plan), until the model hangs slightly nose down. Sketch 9. For easy access to the motor for starting, open up top decking piece M. Full instructions for starting the Cox T.D. .010 are supplied with the motor. Access to the needle valve is through the cut out section on the circular opening in piece F. When the motor is running at full power, close top decking and lock. Best method of launching (free flight and tethered) is to hold the sides of the model lightly between the hands, place near the floor and give a steady push forward in the direction you wish your hovercraft to travel.

Now a few tips on trim. On first test, your hovercraft will quite likely tend to rotate in a clockwise direction (the effect of propeller torque). To correct this move the rudder (W) over to the left (model viewed from the rear and below). The exact amount is a matter for experiment. On our model the rudder was moved to the angle shown in Sketch 11. By the way, with use the rudder tends to work too freely and is best fixed with small balsa blocks when the right position for straight flight has been obtained. Rotation can also be checked by enlarging the anti-rotation ducts, Sketch 10, but this should not be necessary. Slight adjustment up or down of the anti-torque vanes (B) will control rotary movement of the model (either direction) but as shown on the plan they needed no adjustment on our own model. Your hovercraft may also tend to slide sideways. This is corrected by adding a very small amount of weight to the opposite side (conceal this weight by a recess cut in pieces H).

Remember you are trimming a flying model, that has no direct contact with the ground, so very small additional weight can greatly alter the flight performance. A little patience and perseverance and you'll be in the hovercraft business in no time. For tethered operations we have included a lay-out of a simple pole and tether line. Remember to weight the base of the pole before take-off! Sketch 12.

Good luck and "good hovering" to you.



Getting with the action! Hovastar in actual flight on its cushion of air. Tiny T.D. 010 at full revs.

Z1

C/L

D

Only

Z.1.

Join this line to Z1-Z1 above

HOVASTAR

INDOOR HOVERCRAFT

Z1

Power : Cox TD ·010

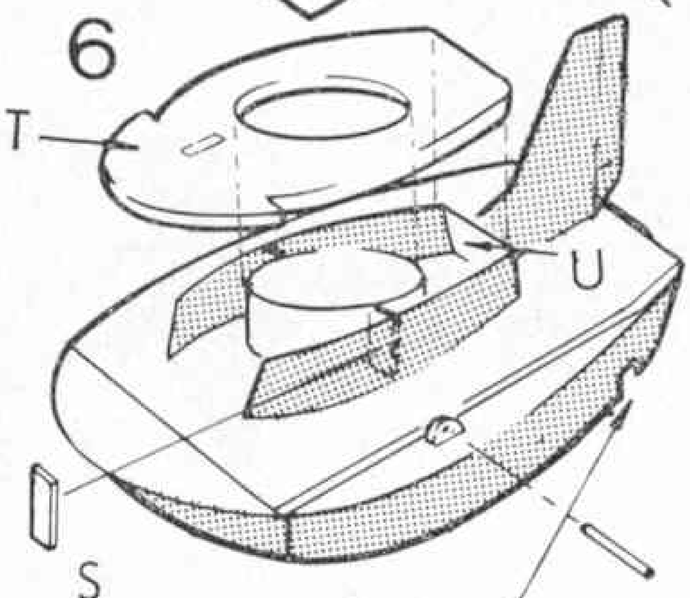
Weight : 3·5 ozs.

N.B. Use tracing and carbon paper for transfering parts to wood.

Front and rear ends C.D. 3/32" sht.

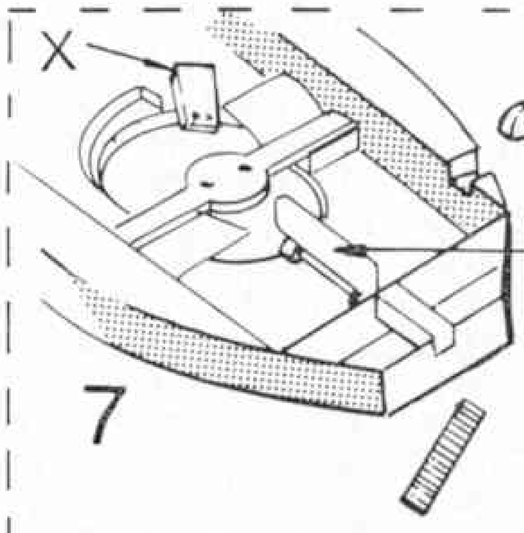
F Outline

Outline M



Anti-rotation Duct

Access cut-out for glow-plug clip and needle valve



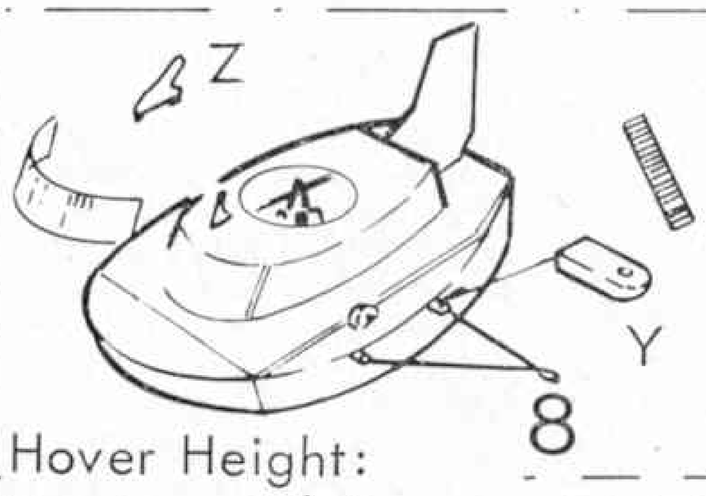
W

Important. Dowel rod must be a tight fit in mounts

Rudder Mount

Z.1.

Slot



Cabin slots in decking piece M only

Rudder Mount

Sides C 3/32" sht.

Hover Height:
Front - 1/2" approx.
Rear - 3/4" approx.

C/L

Rear Cabin

Piece U 1/16" sht.

W Rudder 1/16" sht.

Tissue silk or Nylon

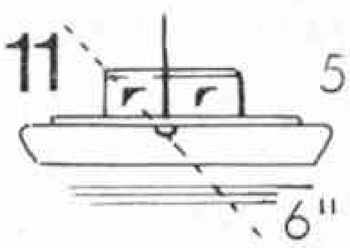
Paper Tube

Decking Piece M

Balance Point

Thread

9



Pin

5'-6'6"

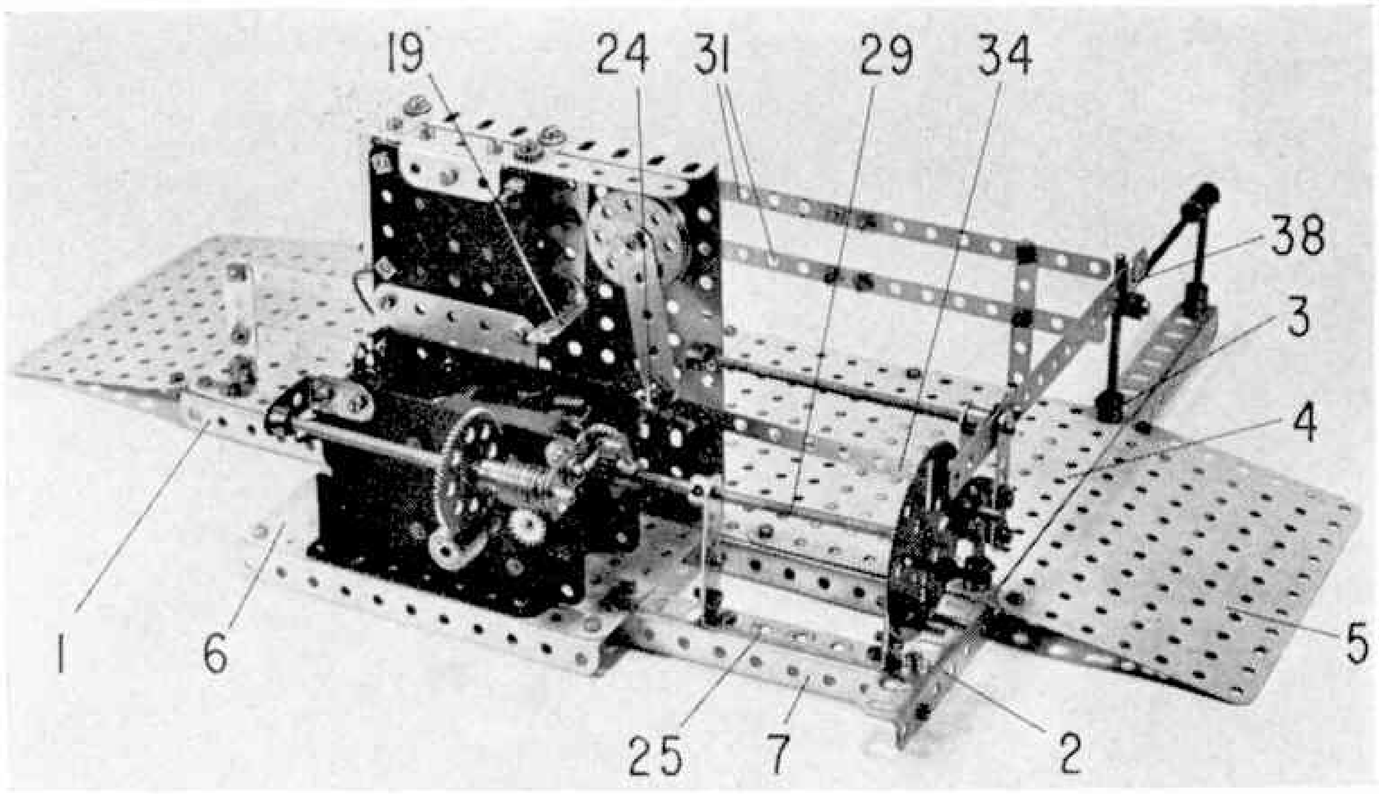
Decking piece F

6" sq.

12

1/2" Dia. dowel

4" High



Try building this AUTOMATIC CAR-PARK ENTRANCE says 'Spanner'

IN these days of mass production, increased efficiency and cost reduction, the emphasis is being placed more and more on automation—the replacement of man by machine.

Automation can be found in all walks of life from the heaviest industry to the humble office switchboard and it is also having an increasing effect on that other example of modern man, the motorist. The motorist himself has not of course been replaced as yet, but he is coming into contact with machines with increasing frequency: the serve yourself petrol pump, the coin-operated car wash, the automatic barrier, and so on. It is one of these—the barrier—which has provided inspiration for our new model, illustrated—an Automatic Car Park Entrance working on the "coin-in-the-slot" principle. The car draws up at the barrier, a coin is inserted into a slot in the barrier control unit, the barrier rises, the car drives through, and the barrier drops.

As regards construction, a runway is built up from two $12\frac{1}{2}$ in. Angle Girders 1 connected together at one end by a $12\frac{1}{2}$ in. Angle Girder 2, the connections being made by Rod Sockets 3 instead of Bolts. These Rod Sockets also hold two Fishplates and a $5\frac{1}{2} \times 3\frac{1}{2}$ in. Flat Plate 4 in place, three further $5\frac{1}{2} \times 3\frac{1}{2}$ in. Flat Plates being bolted as shown between the remainder of the Girders. The Bolts at the opposite ends of the Girders also hold two Fishplates in position, these and the first Fishplates then being angled downwards slightly, after which two more $5\frac{1}{2} \times 3\frac{1}{2}$ in. Flat Plates 5 are bolted, one to each pair of Fishplates to serve as runway access ramps.

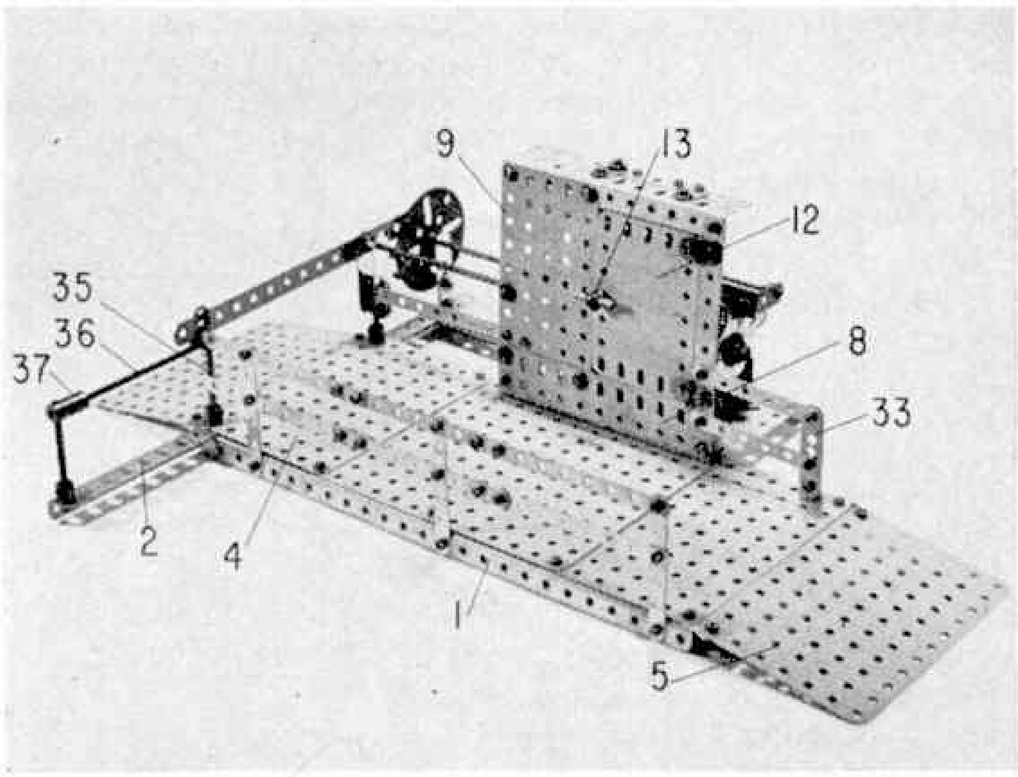
The Bolts securing the two centre Flat Plates to one Angle Girder 1 also fix in position a $5\frac{1}{2}$ in. Angle Girder and a final $5\frac{1}{2} \times 3\frac{1}{2}$ in. Flat Plate 6, the latter projecting outwards from the run-way and edged by another $5\frac{1}{2}$ in. Angle Girder. Flat Plate 6 is attached to Angle Girder 2 by a $4\frac{1}{2}$ in. Angle Girder 7, then bolted to the spare flange of the first $5\frac{1}{2}$ in. Angle Girder is a $5\frac{1}{2}$ in. Flat Girder 8, to which are secured a $4\frac{1}{2} \times 2\frac{1}{2}$ in. Flat Plate 9 and a $4\frac{1}{2}$ in. Strip 10, the upper ends of the Strip and Plate being connected together by a further $5\frac{1}{2}$ in. Angle Girder. A $5\frac{1}{2}$ in. Strip 11 is attached to the spare flange of this Girder by two Fishplates, use being made of the slotted holes in the Fishplates to ensure that a gap exists between the Strip and Girder large enough to take the operating coin, or, in our case, an 8-hole Wheel Disc representing the coin.

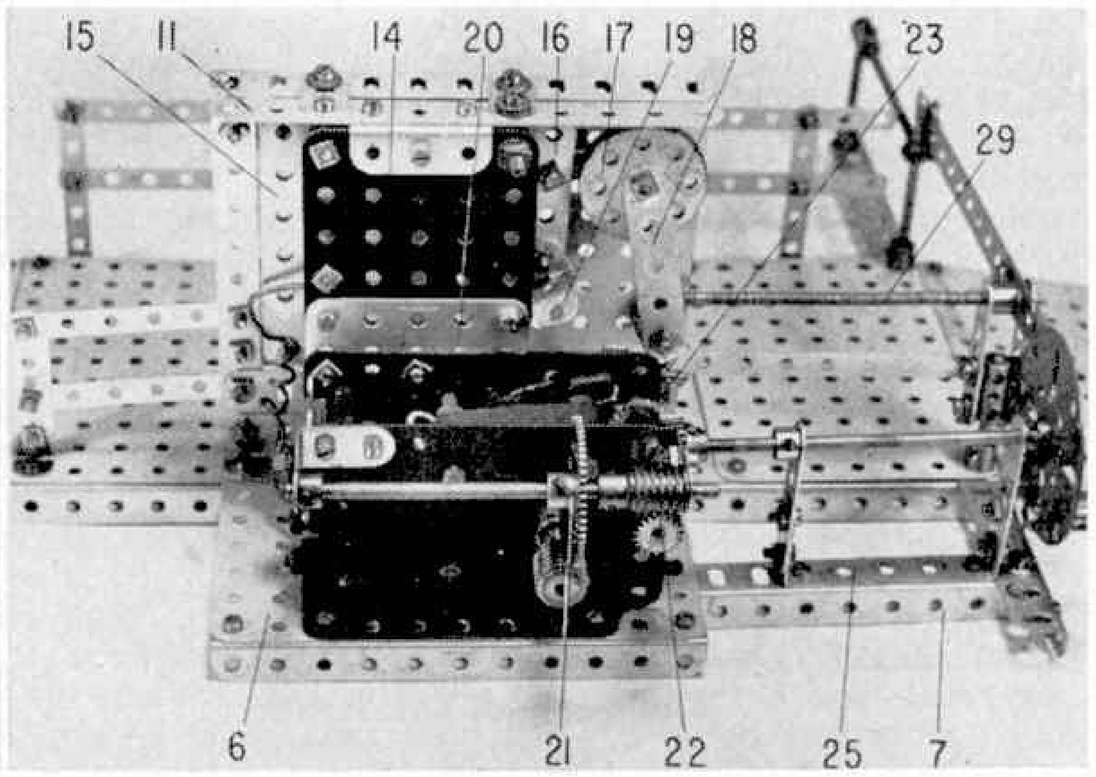
When the model is completed and operational, the coins fed into it are retrieved through a small door supplied by a $3\frac{1}{2} \times 2\frac{1}{2}$ in. Flexible Plate 12 attached to Strip 10 by two Hinges. A Fishplate, lock-nutted to a Handrail Support 13 revolving in a hole in the Plate, serves as a door catch, with the handle supplied by a 1 in. Rod fixed in the head of the Handrail Support.

Secured to Strip 11 by a $1\frac{1}{2}$ in. Angle Girder is a $2\frac{1}{2} \times 2\frac{1}{2}$ in. Insulating Flat Plate 14, to which the coin guides 15 and 16 are attached, each guide consisting of three 2 in. Strips between two $2\frac{1}{2}$ in. Flat Girders, the upper ends of the Strips being level with the upper ends of the Girders. Guide 15 is rigidly fixed on two $\frac{3}{4}$ in. Bolts held by Nuts in the Insulating Flat Plate, while guide 16 is pivotally attached to the Plate by being fixed on a $1\frac{1}{8}$ in. Bolt lock-nutted to the Plate. The Bolt passes through the upper holes in the Girders and Strips of the guide. Note, incidentally, that in both guides the fixing Bolts pass through the slotted holes of the Flat Girders, full use being made of the slots to ensure a shallow channel between the edges of the Girders and the intermediate 2 in. Strips.

A counterweight, acting on guide 16, is provided by five Wheel Discs 17 bolted, along with a $2\frac{1}{2}$ in. Strip 18, to a 2 in. Strip which is in turn bolted through the second holes from the top of the guide. Bolted through the second holes from the lower end of the guide is a $1 \times \frac{1}{2}$ in. Angle Bracket 19 which serves as a "stop" to hold the guide close to the vertical against the action of the counterweight. With the guide in the vertical position, the operating coin is prevented from dropping straight through the guides by a Bolt carrying two Washers, fixed in the inner lower hole of each guide. An Angle Bracket is bolted to the lower end of Strip 18.

Now secured to Flat Plate 6 is an E15R Electric Motor, the inner sideplate of this Motor being attached to the lower edge of Insulating Flat Plate 14 by a $2\frac{1}{2}$ in. Flat Girder 20. A Worm Gear, fixed on the output shaft of the Motor, meshes with a 57-teeth Gear 21, fixed, along with another Worm 22, on a $4\frac{1}{2}$ in. Rod journalled in a 1×1 in. Angle Bracket and a $1 \times \frac{1}{2}$ in. Angle Bracket, both bolted to the nearby Motor sideplate. Note that a Fishplate is bolted to the longer lug of the $1 \times \frac{1}{2}$ in. Bracket to provide a circular hole in which the Rod is journalled. Worm 22 meshes with a $\frac{1}{2}$ in. Pinion fixed on a $3\frac{1}{2}$ in. Rod, held by Collars in the Motor sideplates. Also mounted on this Rod, between the sideplates, is a $\frac{3}{4}$ in. Contrate Wheel 23, while fixed on the inner end of the Rod is a Short





Opposite, Easy to build and interesting to operate is this Automatic Car Park Entrance Barrier which works on the 'coin-in-the-slot' principle. Shown in this picture from the control section side.

Above left, A general view of the completed model from the car ramp side.

Above right, A close-up view of the control section of the model showing the E15R Motor and drive to the barrier

Below left, In this close-up view of the control box, the coin-retrieving door has been opened to show the coin guides with the 'coin' (a Wheel Disc) in position in the guides.

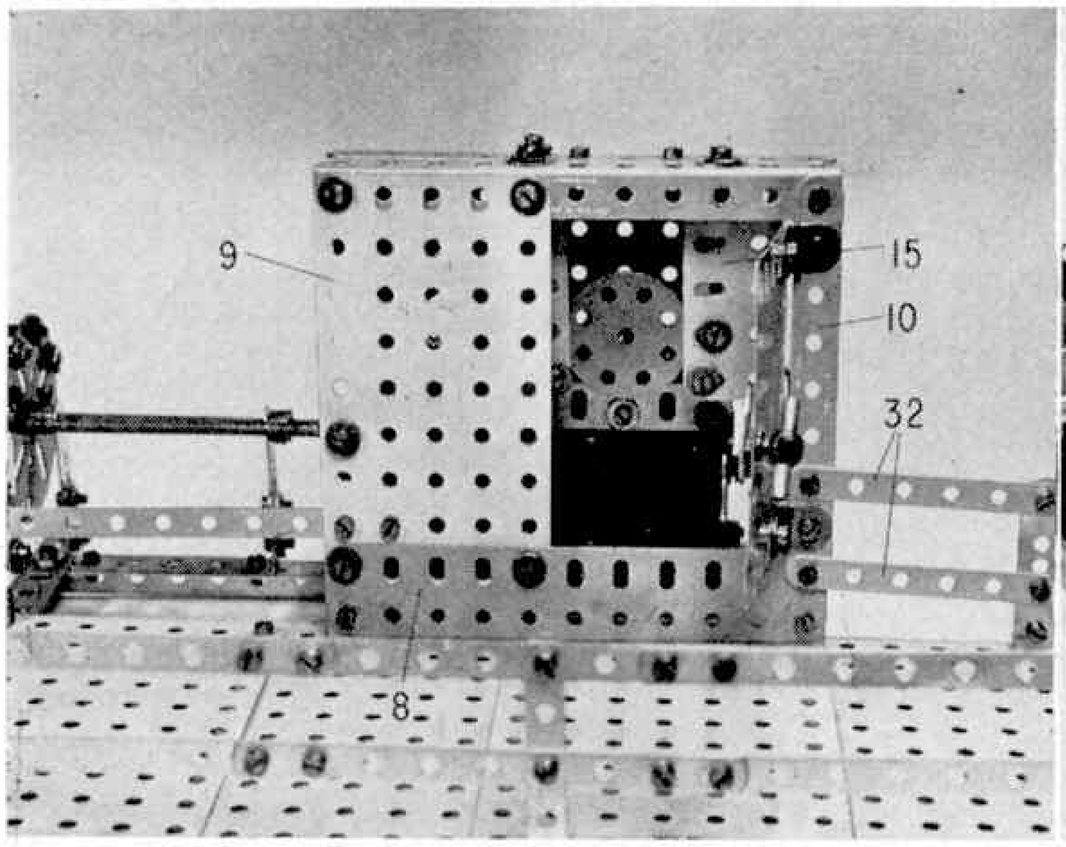
Below right, The barrier is raised by means of a special large cam built up from a Faceplate, to which four Threaded Pins are secured.

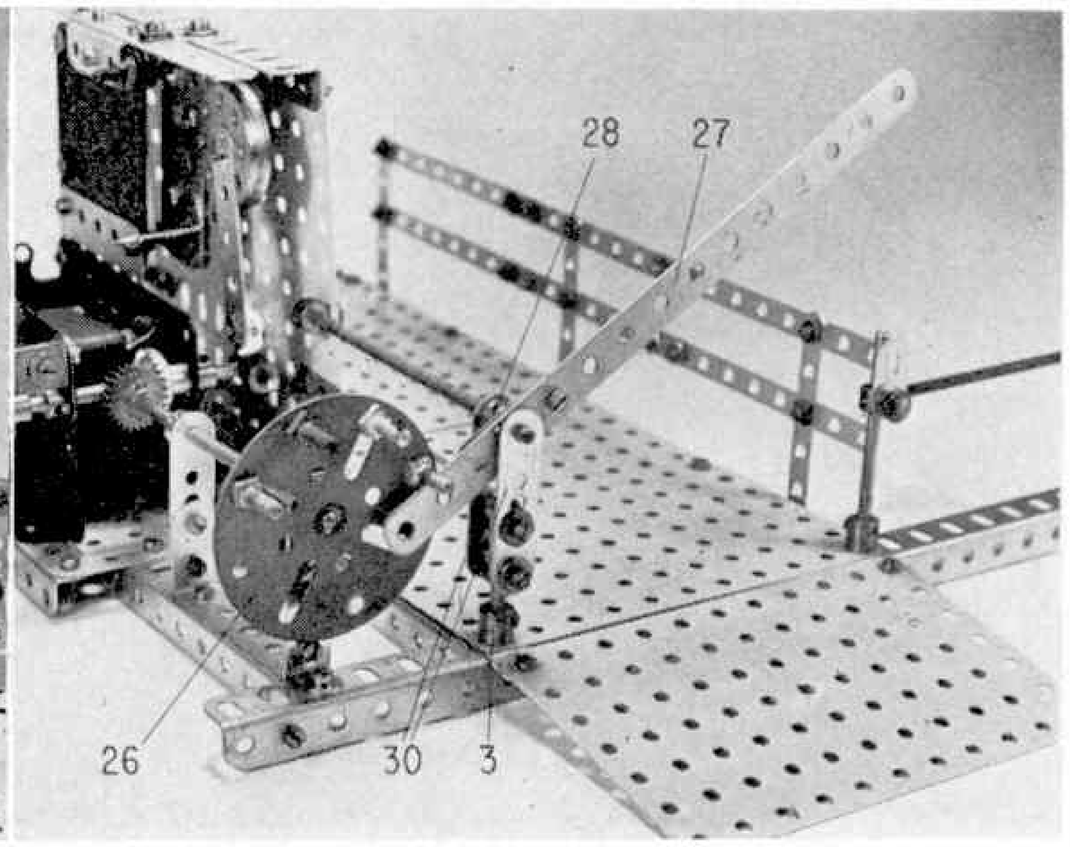
Coupling 24, in the longitudinal bore of which a short electrical 1 in. Pivot Rod is held. When the model is in operation, this Pivot Rod strikes against the Angle Bracket at the lower end of Strip 18 to tilt guide 16, thus allowing the operating coin to drop from the guides to complete the operating sequence.

In mesh with Contrate 24 is a $\frac{3}{4}$ in. Pinion on the end of a $4\frac{1}{2}$ in. Rod journalled in the upper end holes of two 2 in. Strips, bolted to the lugs of a $2\frac{1}{2} \times 1$ in. Double Angle Strip 25, bolted in turn to Angle Girder 7. Mounted on the opposite end of the Rod is a Faceplate 26, in adjacent holes in the face of which four Threaded Pins are fixed, as shown. This whole arrangement serves as a large cam which raises the entrance barrier when the model is set in motion. The barrier itself consists of a $7\frac{1}{2}$ in. Strip 27 bolted to a Double Arm Crank 28, pivoting freely on another $4\frac{1}{2}$ in. Rod 29, mounted in a Collar fixed by one of its threaded bores to Flat Plate 9. The other end of the Rod is mounted in two 2 in. Strips 30 fixed to a Coupling which is mounted on a $1\frac{1}{2}$ in. Rod held in nearby Rod Socket 3. Note that two Washers are carried on each Bolt securing the Strips to the Coupling, one Washer each side of the Strip.

The final touch of realism is given to the model by fencing lining the runway. Along the open side, two horizontal $11\frac{1}{2}$ in. compound Narrow Strips 31, each built up from three $4\frac{1}{2}$ in. Narrow Strips, are bolted to three upright 3 in. Narrow Strips secured to Angle Girder 1. At the opposite side, two 3 in. Narrow Strips 32 are bolted between Strip 10 and a 2 in. Strip 33, attached to an Angle Bracket fixed to one of the $5\frac{1}{2} \times 2\frac{1}{2}$ in. Flat Plates of the runway. A $4\frac{1}{2}$ in. Narrow Strip 34 is also bolted to Flat Plate 9 to run parallel with Rod 29.

Mounted in remaining Rod Socket 3 is a $2\frac{1}{2}$ in. Rod 35 on which a 4-holed Collar (Electrical Part No. 500) is fixed. Screwed into one of





the threaded bores of this Collar is a $3\frac{1}{2}$ in. Screwed Rod 36, the other end of which is held in a Coupling 37, fixed on a 2 in. Rod held in a Rod Socket secured to the end of Angle Girder 2. Also attached to the 4-holed Collar is a Fishplate 38 which, together with the Collar and the upper end of Rod 35, provides the receiving "slot" for the end of the entrance barrier.

Wiring

To finally complete the model, the wiring circuit is added and this should present no problem. It will be realised at this stage that the two coin guides are electrically isolated from each other, being attached to an Insulating Flat Plate. The rigid guide is therefore connected by a short length of insulated wire to one of the Motor terminals, one lead from the power source being connected to the other Motor terminal and the second lead from the power source being connected to the protruding shank of the $1\frac{1}{8}$ in. Bolt on which the pivoted coin guide is mounted. When the coin or Wheel Disc is then inserted in its slot, being metal, it completes the circuit and brings the motor into operation. This raises the barrier and at the same time revolves Short Coupling 24 which, in due course, strikes against the Angle Bracket bolted to Strip 18, with the result mentioned earlier. When the coin drops, the circuit is broken and the Motor stops, by which time the barrier has returned to the "down" position. Careful adjustment is of course required to ensure that the timing of operations is correct, but once this has been achieved, the model will be found to work well and very impressively.

PARTS REQUIRED

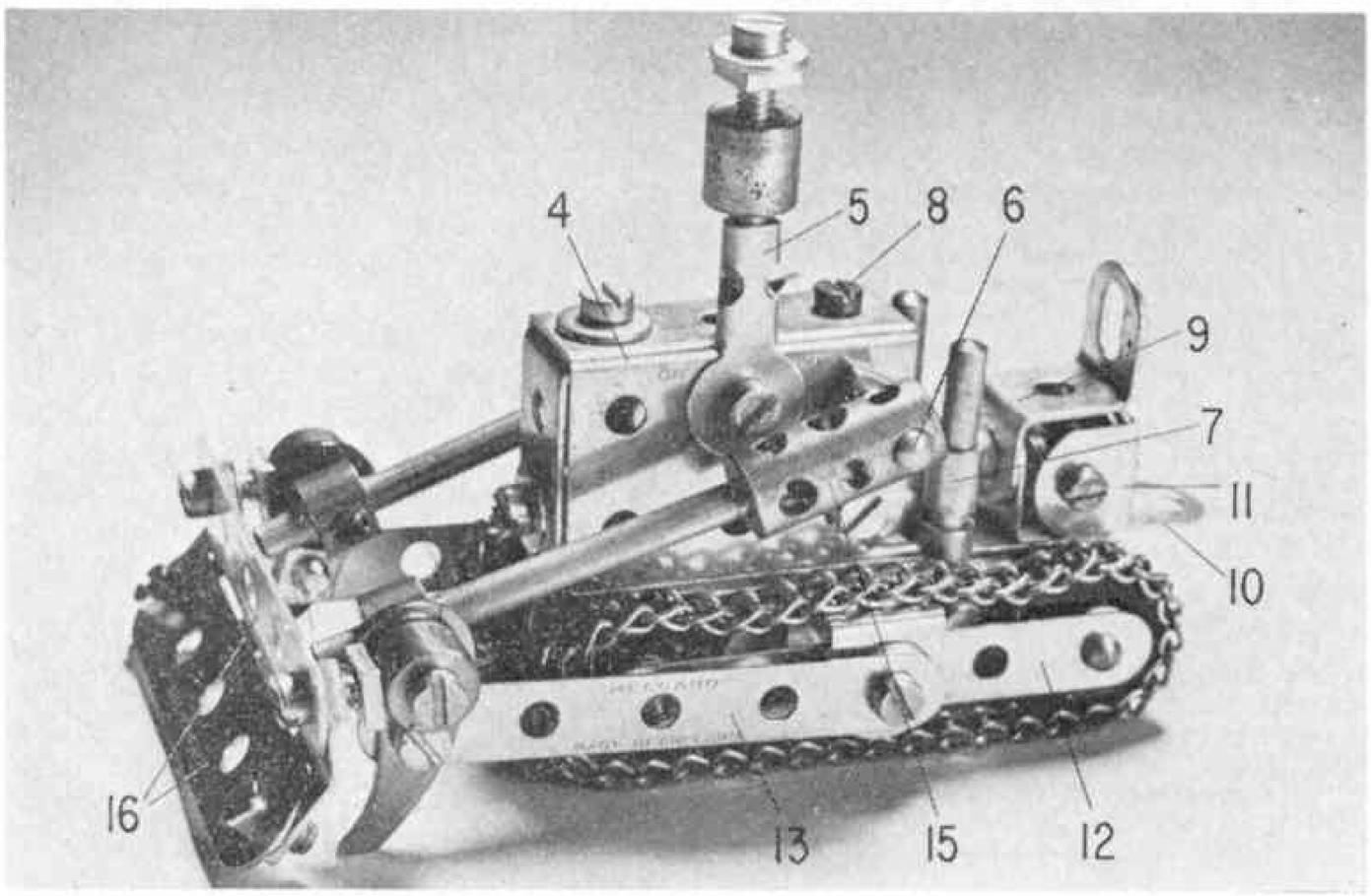
1—1b	3—15a	30—38	3—111c
1—2	1—16	1—46	1—111d
1—2a	1—16a	7—52a	2—114
1—5	1—17	1—53a	4—115
12—6	2—18b	6—59	1—136
3—8	5—24a	1—62b	1—166
3—9	1—25	2—63	3—179
1—9a	1—26	1—63d	1—190a
1—9b	1—27a	1—80a	6—235a
9—10	1—29	1—103	7—235d
3—12	2—32	5—103f	1—500 (140y)
1—12a	88—37a	1—109	1—511
2—12b	82—37b	2—111	1—550
			1—E15R Motor

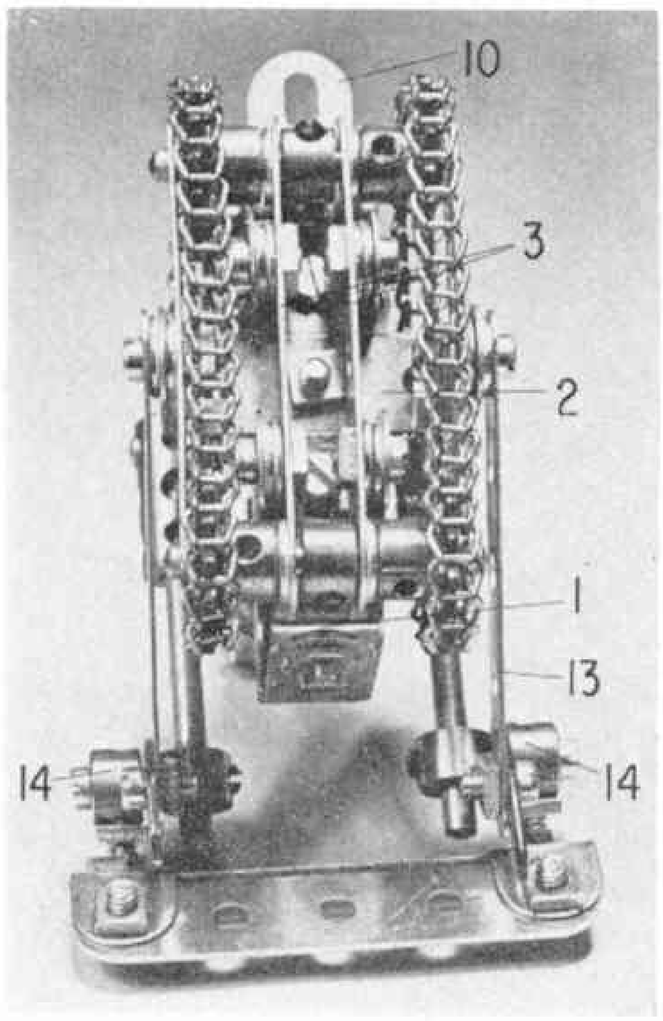
Simplicity Special

'Spanner' describes three captivating miniatures from readers

Right, all the atmosphere of the real thing has been captured in this Simplicity Bulldozer, designed by Mr R. J. McEnery of Yate, Bristol.

Below, an underside view of the Bulldozer showing the chassis layout.



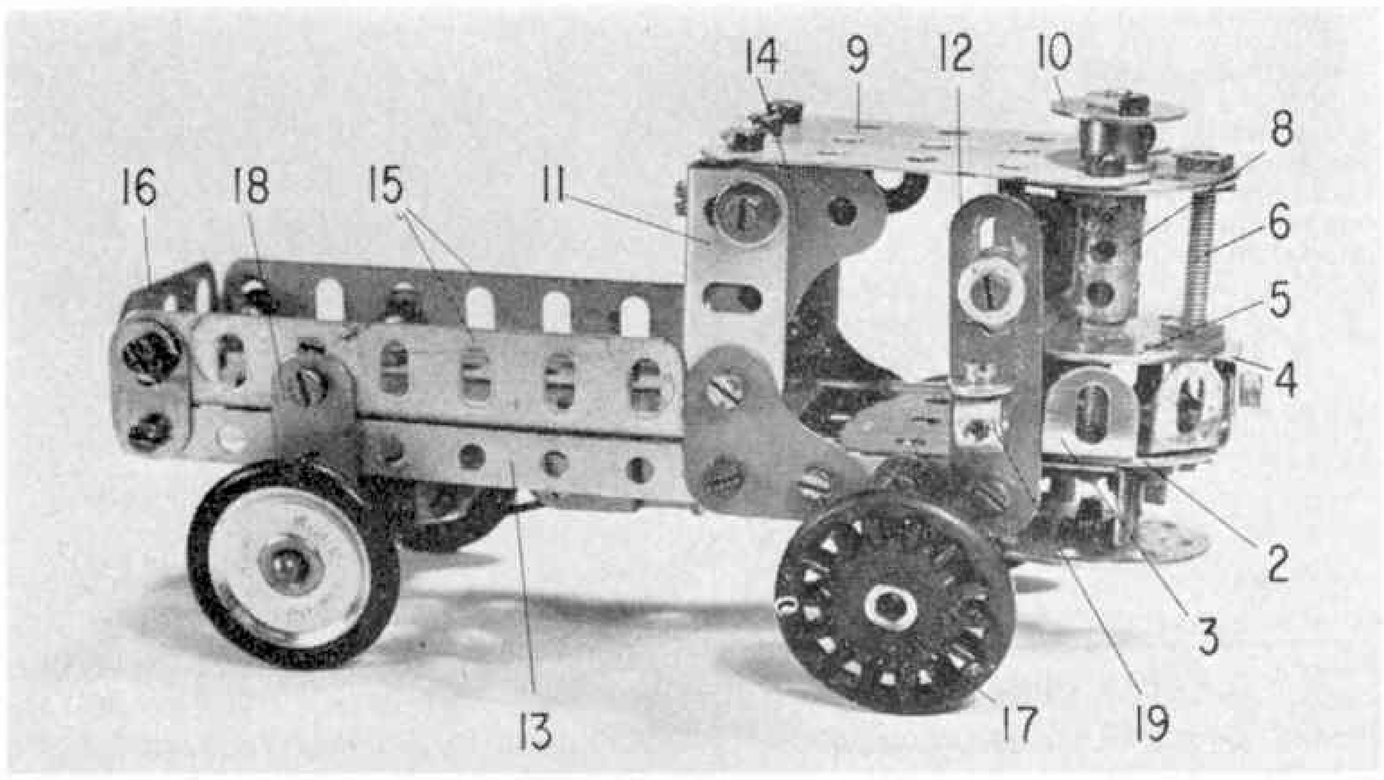


REGULAR readers of Meccano Magazine will not be surprised at the sight of the three delightful little models featured in this article. I particularly like "Simplicity" models and I have made no secret of the fact in these pages over the years. I feature such models fairly regularly, however, not only because of my personal feelings, but also because the vast majority of Meccano modellers share my opinion—practically everyone likes the "little-'uns"!

For the benefit of readers new to the hobby, Simplicity models are small-scale reproductions which capture the lines and atmosphere of their subjects, while using only a comparatively few, carefully selected parts. I am sure all will agree that the three models illustrated fall into this category.

First in line is a splendid little Bulldozer, designed and built by Mr. R. J. McEnery of Yate, Bristol. The chassis consists of a $2\frac{1}{2} \times \frac{1}{2}$ in. Double Angle Strip 1, lugs upward, to which two Double Brackets are bolted, lugs downward, the fixing Bolts passing through the second holes from each end of the Double Angle Strip. A $1\frac{1}{2} \times \frac{1}{2}$ in. Double Angle Strip 2 is also bolted to Double Angle Strip 1, then secured inside the lugs of the Double Brackets are two $2\frac{1}{2}$ in. Strips 3, the Strips being spaced from the lugs by two Washers on each securing Bolt.

Fixed by its longer lug to the forward lug of Double Angle Strip 1 is a $1 \times \frac{1}{2}$ in. Angle Bracket, to the shorter lug of which a Channel Bearing 4 is bolted to represent the engine casing. Secured to the Channel Bearing before it is fitted, however, are a Rod and Strip Connector 5, two Threaded Pins 6, one each side, two right-angled Rod



Unmistakably recognisable as an old-time Sentinel Steam Wagon designed by Mr Roger Le Rolland of Stoke-on-Trent, Staffs. Note the use of a Rubber Ring on a Multi-purpose Gear to give a realistic spoked road wheel.

and Strip Connectors 7 and an Angle Bracket held by Bolt 8, the last enclosing the rear end of the Girder Bracket. Two 1 in. Rods are fixed in the Right-angled Rod and Strip Connectors to represent steering control levels, while an Adaptor for Screwed Rod is fitted to the ordinary Rod and Strip Connector. Screwed into the Adaptor is a $\frac{1}{2}$ in. Bolt, on which a Washer is held by a Nut, the combined arrangement representing the exhaust pipe and silencer. The seat is provided by a $\frac{1}{2}$ in. Reversed Angle Bracket 9, bolted to an Angle Bracket which is in turn bolted through the rear end hole in the back of Double Angle Strip 1. Another Angle Bracket 10, along with a Double Bracket 11, is bolted to the rear lug of the Double Angle Strip.

Now lock-nutted firmly to each lug of Double Angle Strip 2 are two $2\frac{1}{2}$ in. Narrow Strips 12 and 13, one each side of the lug and each spaced from the lug by a Washer on the shank of the fixing $\frac{3}{8}$ in. Bolt. Journalled in the end holes of Strips 12 and in the corresponding holes of Strips 3 are two $1\frac{1}{2}$ in. Rods, each held in place by a Collar between Strips 3 and each carrying two $\frac{3}{4}$ in. Sprocket Wheels between Strips 3 and 12. Each Sprocket is free on its Rod, being held in place by the Strips, and it is spaced from each Strip by a Washer. Running on the Sprockets are "caterpillar" tracks supplied by short lengths of Sprocket Chain.

Narrow Strips 13, of course, serve as the bulldozer blade supports. Bolted to the end of each Strip is a Pawl without boss, point downwards, the securing Bolt passing through the hole in the centre of the Pawl. A $\frac{3}{8}$ in. Bolt is then fitted with a loose Collar 14, is passed through the end hole in the Pawl and screwed into one threaded bore of another Collar, in the longitudinal bore of which a 2 in. Rod is fixed. The other end of this Rod slides in the longitudinal bore of a Coupling 15 mounted by one end transverse bore on nearby Threaded Pin 6. Finally, the blade itself is built up from two $2\frac{1}{2}$ in. Strips 16, connected together at the ends by two Obtuse Angle Brackets, with $\frac{3}{8}$ in. Bolts being used to secure the upper Strip. Each of these Bolts is fitted with two Nuts and screwed into one tapped bore of appropriate Collar 14, the second Nut being used to lock the Bolt in the Collar.

PARTS REQUIRED

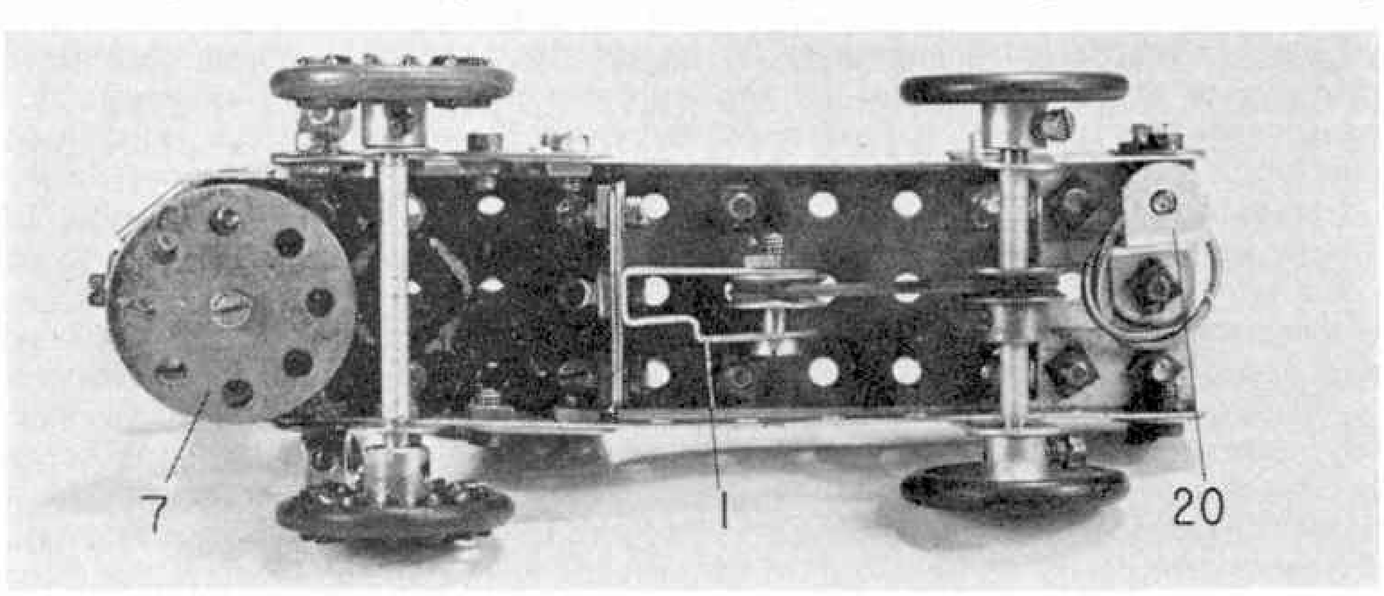
2—4	2—18a	6—59	1—125
2—5	2—18b	2—63	2—147c
3—11	31—37a	1—94	1—160
3—12	22—37b	4—96d	1—173a
1—12b	18—38	1—111	1—212
2—12c	1—48	5—111c	2—212a
2—17	1—48a	2—115	4—235

Sentinel Steam Wagon

Mr Roger Le Rolland of Stoke-on-Trent, Staffs. is the provider of our second simplicity offering which, as a glance at the photograph will prove, is easily identified as a Sentinel Steam Wagon. The chassis is built up from two $2\frac{1}{2} \times 1\frac{1}{2}$ in. Flanged Plates, joined end to end, the central securing Bolt also fixing a Stepped Bent Strip 1 in position, pointing rearwards under the rear Flanged Plate. Bolted to the top of the forward Plate, and overlapping its front end, is an 8-hole Wheel Disc 2, the securing Bolts also fixing two Angle Brackets 3 in place. Three further Angle Brackets are bolted through the foremost holes of the Wheel Disc, another Angle Bracket 4 being bolted to the centre front Bracket, as shown. A second 8-hole Wheel Disc 5 is tightly secured to the spare lug of this Bracket, using a $1\frac{1}{8}$ in. Bolt 6, shank pointing upwards. A third 8-hole Wheel Disc is secured by Nuts to the upper end of this bolt shank, a fourth similar Wheel Disc 7 being bolted to an Angle Bracket secured to the forward flange of the front Flanged Plate.

Fixed by Nuts in the centre holes of the upper two Wheel Discs is a 2 in. Screwed Rod, carrying a Coupling 8 between the Discs and fixing a $2\frac{1}{2}$ in. Strip 9, a Collar and a $\frac{3}{4}$ in. Washer 10 in place above the top Disc. Another two $2\frac{1}{2}$ in. Strips are bolted to the top Disc, these being connected together at their rear ends by a $1\frac{1}{2}$ in. Angle Girder. This Girder is in turn connected by two more $1\frac{1}{2}$ in. Angle Girders 11 to a fourth $1\frac{1}{2}$ in. Angle Girder bolted to the rear top of the forward Flanged Plate.

A $1\frac{1}{2} \times \frac{1}{2}$ in. Double Angle Strip is next bolted to the rearmost hole in Wheel Disc. 2. Secured to each lug of this Double Angle Strip is a 2 in. Slotted Strip 12, to the lower end of which a $5\frac{1}{2}$ in. Narrow Strip



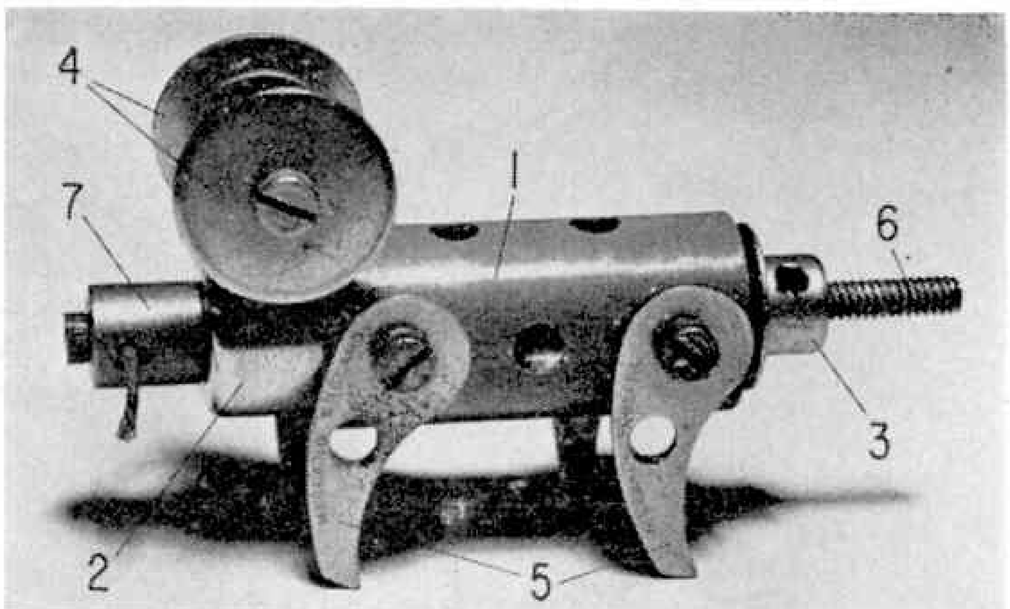
An underside view of the Steam Wagon. The model is not powered, but the Driving Band running between the two $\frac{1}{2}$ in. Pulleys has been included for effect

13 is bolted, this Strip running rearwards and being connected to nearby Angle Girder 11 by a 1 in. Corner Bracket, as shown. Another similar Corner Bracket 14 is bolted to the upper end of the Angle Girder.

Two 3½ in. Angle Girders 15 are now secured to the top edges of the rear Flanged Plate, these Girders projecting two holes beyond the rear edge of the Plate, where they are connected by a 1½ in. Strip and a 1½ in. Angle Girder 16. The rear end of each Girder 15 is connected, in turn, to the rear of each Narrow Strip 13 by a Fishplate. Further Fishplates are bolted through the second holes from the front of the Narrow Strips to provide bearings for the front axle, supplied by a 2½ in. Rod and held in place by Multi-purpose Gears 17, fitted with Rubber Rings to represent the front road wheels. The rear wheels are 1 in. Pulleys with Rubber Rings, these also mounted on a 2½ in. Rod journalled in the lower holes of two 1½ in. Strips 18 bolted to Angle Girders 15. Also mounted on this Rod is a ½ in. Pulley with boss which is connected by a 2½ in. Driving Band to a ½ in. loose Pulley on a Pivot Bolt fixed in Stepped Bent Strip 1.

Two sidelamps are each provided by a 4-hole Collar 19 screwed on to the shank of a Bolt held by a Nut in Slotted Strip 12. Another Bolt, fitted with a Washer, is screwed into the upper hole in the Collar. Last of all, a bracket for what I presume is a water hose coil is provided by a ½ in. Reverse Angle Bracket 20, bolted to Angle Girder 16, the hose, itself, being represented by a short coil of Spring Cord, as shown.

Built originally for use with a Grandfather Clock, this little Mouse designed by Mr Ken Senar of Greasby, Cheshire, makes an attractive model in its own right.



PARTS REQUIRED

3—5	2—22	11—38	1—63
3—6a	1—23a	1—38d	1—81
2—9b	1—23b	1—44	1—111d
5—9f	4—24a	1—48	1—125
4—10	2—27f	2—51	4—133a
7—12	61—37a	2—55a	4—155
2—16a	55—37b	1—59	1—147b
			1—500 (140y)

Mini Mouse

Not "Minnie the Mouse", of Walt Disney fame, but a little Mini Mouse is our final simplicity offering for this feature. It was originally designed and built a fair number of years ago by Mr Ken Senar of Greasby, Wirral, Cheshire as one of the attractions in a detailed Grandfather Clock he built at the time—obviously based on the "Hickory, Dickory, Dock" theme. Mr Senar thought the Mouse might be of interest in its own right and, as I certainly found it so, I am delighted to include it here. The body consists of a Sleeve Piece 1 with a Chimney Adaptor 2 wedged in one end and a ½ in. Pulley with boss 3 wedged in the other end. Before the Chimney Adaptor is fitted, however, a Double Bracket is bolted through one side hole of the Adaptor, two ¾ in. Washers 4 being secured one to each lug of this Bracket to represent the ears, and four Pawls without boss 5 are bolted to the Sleeve Piece, as shown, to serve as legs.

With the Adaptor and Pulley wedged in place, a 3 in. Screwed Rod 6 is passed through the central hole in the Adaptor, down the Sleeve Piece and is secured in the boss of the Pulley with a Grub Screw. A Threaded Boss 7 is then screwed on to the front end of this Rod, the final touch being supplied by a short length of Cord—the Mouse's whiskers—which is passed through the transverse bores of the Threaded Boss and held in place by a Set Screw, screwed into the front longitudinal bore of the boss. The end result of all this is an extremely simple, yet highly appealing model!

PARTS REQUIRED

1—11	7—37b	1—64	4—147c
1—23a	2—38a	1—69	1—163
7—37a	1—40	1—80c	1—164

Canadian Snowmobiles (*Continued from page 591*)

adjustable headlamp, front and rear bumpers, battery and glove compartment, bicycle handlebar type steering, and you have the snowmobile as it is today.

Approximately a couple of decades ago, snowmobiles were little more than an idea in the mind of their inventor. From these humble beginnings has come a marvellous machine for playing, and working, in the snow. It has taken North America by storm and winter will never be the same again. To its credit must go those uses that have added to the enjoyment of the winter outdoors, and to the more functional tasks these machines perform for man working over snow where other means of transportation are not up to the task. These include such diverse jobs as avalanche patrols in Canada's Rocky Mountains, rescue operations and emergency trips during snow storms, timber cruising and petroleum prospecting in northern areas.

While the credits more than offset the debits, the latter are sometimes serious enough to prompt concern. Inconsiderate drivers who think a snowmobile gives them the licence to ignore the rights of others have given the snowmobile its worst black mark. Also, some unscrupulous operators are guilty of the ruthless harassment and cold-blooded pursuit—often to death—of wild animals. There are laws, of course, to take care of this sort of thing, should the offender be caught. Unfortunately, however, there is the damage to wildlife caused by people just out for a good time and completely unaware of the tragic results of their fun. Periods of rest are essential for most wild life during hard weather. Survival in winter is delicately balanced to their ability to find food without too much exertion. In the hours when animals are least active, snowmobiles are not. They keep the wildlife constantly on the move, tire them, and leave them poorly prepared to meet the rigours of their winter life.

Unfortunately, this is one of the hazards of progress. No doubt regulations will be introduced to protect wildlife from unnecessary harassment. For, after all, it seems scarcely idle to claim that snowmobiles seem destined to stay around as long as there is snow. They've proved to have more answers to winter than has even Santa Claus. Moreover, they don't work just one night a year. Snow or no snow, they are on the go across African sands, Louisana bayous and Central American swamps. Tallyho!

Pidgin English, he die bimeby?

Not yet awhile, anyway, says E. R. Yarham —this widespread lingua franca is too useful

"PAPA me belong topside. Speak good along him." Understand it? It's the start of the Lord's Prayer in pidgin English.

Not so many years back pidgin English was frowned upon in more than one official quarter, but nowadays it is livelier than ever (it is never less than vivid), and this lingua franca has been given the status of an official language in a number of islands and territories. Certainly pidgin English he no die during the next half century or so.

It is used in missionary teaching, and parts of the Bible, the prayer book and hymn book are regularly published in this language. The "New Guinea Times-Courier" has a supplement in pidgin English once a week for indigenous Papuans, and in the Pacific area Catholic Missionaries run a magazine called "Friend Belong Mi." The New Guinea Education Department puts out a daily programme entirely in pidgin English from a regional broadcasting station.

Pidgin English has grown up, and won't be got down. Some years back the United Nations Trusteeship Council lacked a sense of humour in seeking to veto its use in Papua. In many quarters it is not realised that Melanesian pidgin is a true language, with a grammatical structure of its own, and that it fulfils an essential function in that part of the world by facilitating communication between natives who would otherwise have no language in common, since there are hundreds of different languages in the many islands.

Pidgin English is a great convenience in the South Pacific, where trade is much in charge of the Chinese. And it is not a weapon of racial discrimination but can have its funny incidents. Once the captain of a Japanese warship, paying a courtesy visit to a North Queensland port, was greeted by the mayor in pidgin English and was humourless enough to lodge a diplomatic protest.

What is pidgin English? One encyclopaedia definition runs: "It consists of English, with some Chinese, Malay, Hindustani and Portuguese words, constructed according to Chinese idioms". The name is derived from a corruption of the English word "business", and for a long time pidgin was the only means by which traders could make themselves understood in Chinese ports.

Today pidgin English is widely used right through the Pacific Islands, but chiefly in New Guinea, the Solomon Islands and New Britain. There is a mistaken belief that the tongue is confined to this part of the globe. Actually it falls into three main groups: West African, Chinese, and Melanesian. About a thousand pidgin English words are in general currency, in addition to those which individual natives may use. Polynesians add "um" to verbs—catchum, callum, eatum. No plurals operate, so that "we" becomes "me two fellow", and a speaker stumped for a pidgin word to describe anything substitutes "something".

So indispensable a medium intercourse has it become, that the American Council of Learned Societies commissioned a university professor, Robert A. Hall, to write a guide on pidgin English to help men overseas.

The message on its Jacket read: "Rob-et Hall he-mark-im liklik book 'long talk pidgin. All-right. Plenty-fellow soldier he-look-look paper bimeby. Em look-im dis-fellow book. Dis-fellow book learn-im talk-talk kanaka one-time white man". Translated, this cryptic information means: "Robert A. Hall has written a small handbook for the use of Americans abroad, and this book will teach them to speak this 'language' known both to coloured and white men".

Pidgin English is remarkable for its vividness, a characteristic briefly mentioned earlier. A West African native will apply for a gun licence because "dem bush-meat chop my farm too much." Translated into officialese the sentence runs: "The depredations of the larger wild animals are making my farm almost entirely unremunerative". No doubt this would appeal more to the staff of the local Whitehall, but the peasant gets the gist in far fewer words.

Pidgin English is legal talk in native courts administered by white men. Clerks in the local courts which sit in the Northern Territory of Australia to try Aborigine wrongdoers use the following form of oath to witnesses: "Now we want you to tell us about that trouble. No more gammon, no more humbug, you talkem true fellow all the time. No more what other blacks been talka longa you. Talk what you seen yourself longa your own eye. Now, talk loud fellow all been wantem hear see, bigfellow boss and all about. You talk true fellow all the time, no more be frighten." In other words, "Tell the truth, the whole truth, and nothing but the truth."

The long established pidgin English magazine published in one of the Pacific islands, "Friend Belong Mi", prints stories, crossword puzzles, and articles. This is how a writer describes the working of wireless, and the account also illustrates how the tongue varies from area to area: "Wairless i gudfelo samting. Em samtung belong hariop tru. Wanfelo master i sindaum long half long liklik mashin i salim tok i go longwe mor. Olrait, longwe mor wanfelo oderelo master i sindaum long liklik mashin em save hirim disfelo tok." In plain English: "Wireless is good. It is swift. A man sits down at a small machine and taps with his finger and electricity send his message a long way. A long way off another man sits at another machine and understands the message."

This is the way in which a local reporter presented his account of the wedding of Princess Elizabeth and the Duke of Edinburgh to his native reads: Good feller news e come up along England. Number one Piccaninny belong King belong you and me e marry one long feller man name belong Duke of Edinburgh. E hurrah much long this feller Princess."

Among the Melanesian peoples pidgin English has produced such expressions as "grass belong face" (meaning whiskers) "lamp belong Jesus" (the sun),

"baskets belong trousers" (pockets) "paper talk" (a letter) and "bullamakau banana" (the sausage). Chinese pidgin English describes a bishop as "Top-side piece Heaven pidgin man;" Blackfellows describe the mosquito as "sing 'im longa dark fella" and disinfectant as "kill 'im stink fella". In New Guinea the politest way of saying one needs a bath is "skin belong you 'im stink."

The peoples' vocabulary has added a number of words to the pidgin English widely used. Such as "Kaikai" (to eat) and "niwai" (wood). Native dialects have no "x" sound, and so substitute "kis", "axe" thus becomes "akis". In consequence one gets this delightful definition of a crosscut saw: "Akis belong claws. You push him he go. You pull him he come. Bimbey him kaikai niwai."

Good use is made of repetition, so that a committee becomes "Talk-Talk." A drunken man is "Long long along drink". And for a description of a violin, it would be hard to beat: "Scratch 'im belly, out come squeak allasame pussy-cat." A highbrow fares as badly in Pidgin English as in other languages. He is "Think fella too much". In Darwin, the capital of the Northern Territory, Australia, "No parking" notices are displayed in eight languages, of which Pidgin English is by far the most forceful: "Car no more bing sit down along here."

HAVE YOU SEEN? (*continued from page* 611)

Another book received recently was "Windmills and Millwrighting", by Stanley Freese, which is in fact a new edition of a book first published in 1957. How windmills were built and used, their history, design, equipment, etc. are dealt with by the author, who himself has worked on restoration of many mills and is an expert on them. As their numbers decrease, so fewer people have working knowledge, and it is good to see a book of this type conveying so much information from a writer with practical experience. Publishers are David & Charles (Newton Abbot) price £2.50.

From Oliver and Boyd of Edinburgh comes a card-covered title, "Gemstones of the British Isles" by Val Axel Firsoff, price £1.25, which is a remarkably thorough work on the origins of precious, semi-precious, or just pretty stones. The author goes exhaustively into what can be found and where, and in fact a vast amount of geological knowledge is to be derived from the pages. Not light reading for children, but fascinating for, say, A level students and adults interested in nature. As the writer indicates, "finds" are the result of patient searching; his book gives the reader what to look for and where to seek it.

"Scale Models in Balsa" by A. M. Colbridge, published by Arthur Barker (London W.1) at £1.75 runs to 118 pages $8\frac{1}{2} \times 5\frac{1}{2}$ in., illustrated with 103 line drawings, and covers the basic techniques of using balsa for all types of models, even down to ships in bottles. A useful chapter covers preparing plans, and there is an explanation of scales which should clear any confusion. The book is really for beginners in any aspect of modelling with balsa, and should help them to understand more about modelling and particularly how to take advantage of the unusual properties of balsa.

The 37th edition of Stanley Gibbons' "Stamps of the World" is available (Stanley Gibbons Ltd., London W.C.2) and lists, with prices, over 157,000 stamps, with over 30,400 illustrations in its 1,960 pages. Page size is $9 \times 6\frac{3}{4}$ in., and the book is over $2\frac{1}{2}$ in. thick! All stamps, including 1972 issues, are included in this truly mammoth work. Price is £3.50.

TELLURION (*continued from page* 589)

To have had the Moon to scale with the Earth would have meant having a 6 in. ball at a distance of approximately 5 ft. from the Earth globe. This was not possible for reasons of weight and space. The Moon on the model is a small ping-pong ball situated on a long rod coming up from the arm that revolves round the regressing plate. Also on the rod are two 2 in. diameter discs, faced with foil, which bob up and down behind the Earth to give partial eclipses of the Moon when the rod carrying the Moon is in favourable opposition to the Sun.

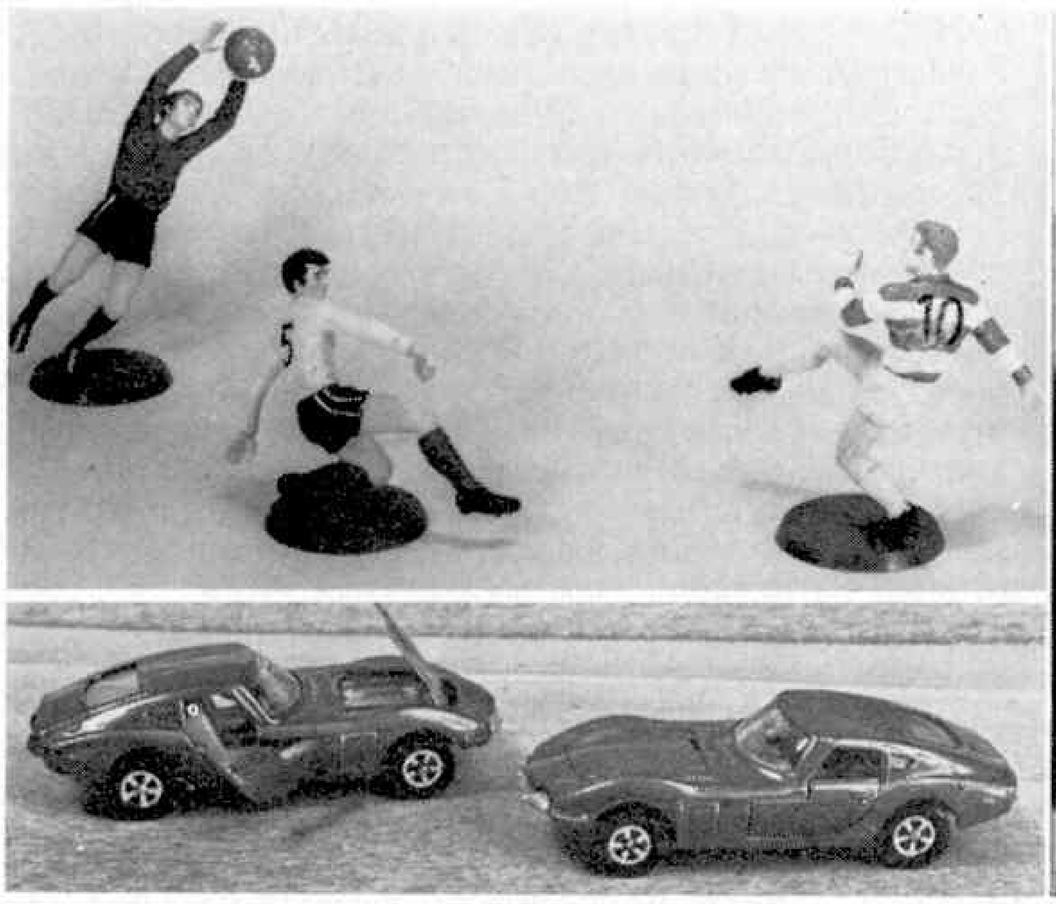
The Sun itself is represented by an orange lamp bulb within a lamp shade that has been blacked and lined inside with foil so that a beam can only be directed at the Earth, when the model is operated in a darkened room, when the Moon phases (eclipses, lunar and solar) can be demonstrated at their best. At the top of the model is another lamp shade which has also been blacked, this having a small low wattage bulb. The shade has been drilled full of small holes to give a star-like effect on the ceiling of the darkened room, although this addition to the model does not project the shapes of any known constellations.

The Zodiac ring, which has been marked out in months and Zodiac constellation names, has also been marked out in degrees, hours and half-hours as well as the start of each season, with the equinoxes and solstices.

As the Earth spins on its axis of $23\frac{1}{2}$ deg., it is subjected to a "wobble" similar to that of a spinning top, the wobble being known as the "precession" of the equinoxes and having a period of 25,783.2 years. The nearest Meccano ratio I could arrive at was 25,725:1 and so, to bring this figure closer, I incorporated another differential (the third in the model) and, by using another subsidiary gear train, I brought the figure to 25,784.68:1—a difference of 1.48 years. This means that a correction of 1 deg. every 50 years revolutions of the year protractor has to be made to bring the precession figure level.

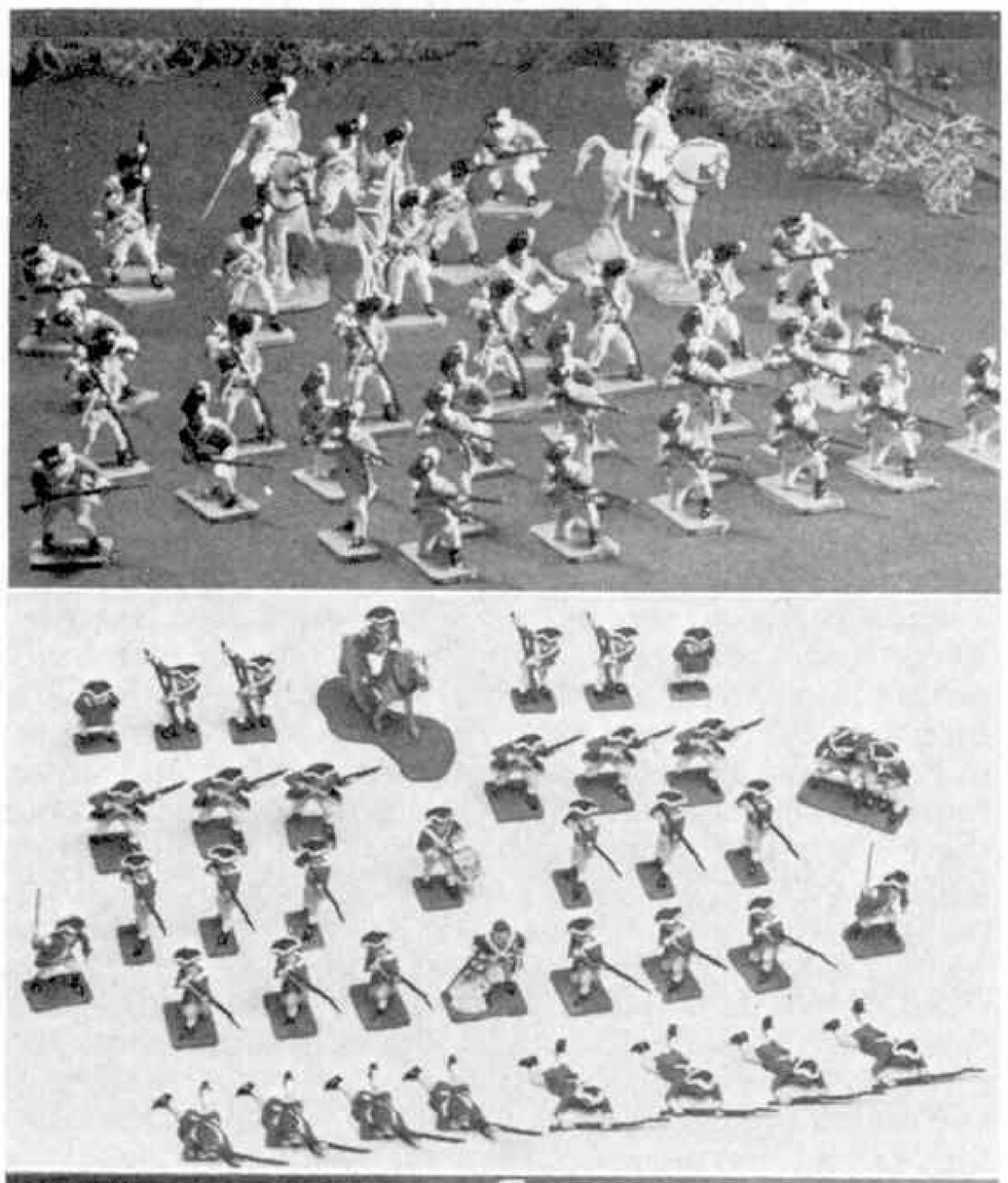
The ratio for precession of the equinoxes is $904,122,614\frac{35}{73}$:1, arrived at by $96\frac{1}{15} \times 365 \times 25,784.68$ which equals a ratio of $804,122,614\frac{31}{75}$:1. At this rate, precession would take approximately 210 days to complete the cycle on the model, with the E.15R Motor running continuously, night and day! In practice, however, a small recently-withdrawn Meccano Emebo Motor driving on the gear shaft, with the date, lunar and node regressing gear shutdown, carries the precession and nutation cycles round in 45 minutes *flat*!

Owing to the frightful ratio in excess of 904 million-to-one, the precession of the equinoxes has to be let out on Tension Springs because of "back-lash" in the gearing. This means that, after every 770 years (approx.), the Springs in both hemispheres have to be reloaded together at the rate of 5 days for the E.15R Motor and at every $1\frac{1}{2}$ minutes for the Emebo Motor. Everything does work, however, and the Tellurion has been of great help to me in my "other" hobby—Astronomy.



Have You Seen?

Charbens' football figures will prove very popular with Soccer fans. The two cars are Toyota 2000 GTs from Lone Star, and the B.E.A. folder speaks for itself.



WITH Christmas almost upon us, Airfix have added seven new kits to their ever increasing range. The latest additions to the aircraft series are North American Aviation's RA-5C Vigilante and the Saab Viggen, both of which suffer from few faults as regards part adjustment and detail. The RA-5C Vigilante retails at 50p and the Viggen 34p.

Anyone interested in the Airfix OO/HO Napoleonic figures will be pleased to hear of the addition of the Waterloo French Infantry to the French Cavalry and Artillery. These figures are extremely well detailed considering their size and the uniforms seem to be fairly accurate. Together with the French Infantry come Washington's army and British Grenadiers, both of which are complete with Officers (on and off horse-back), drummers, and Infantrymen in a variety of positions. Coming more up to date, Airfix have brought out a set of astronauts, comprising 15 astronauts in several different poses, 2 lunar roving vehicles, 2 flying lunar excursion experimental platforms (which are intended to lift one astronaut so he can hover about the lunar surface) and a lunar projector. All these sets sell at 17p each, which is very reasonable even though they are one-colour mouldings which need to be painted.

The last of the new kit releases is the *Rommel* destroyer in 1/600 scale (U.K. price 24p).

Also new from Airfix, but in the book range, is an Airfix Magazine Annual. This annual would be of interest to most modellers, as it covers aircraft, boats, cars, military vehicles, figures and dioramas plus an article on photographing models and one entitled "First take your kit", which is intended for the beginner. The book has been written by contributing writers to Airfix Magazine and is edited by Chris Ellis. The annual is published by Patrick Stephens of 9 Ely Place, London EC1N 65Q, in association with Airfix Products Ltd., and should be in the shops by now selling at £1.25, a shade high, we felt.

Following suit is "Matchbox", who have six recent releases. In the Superfast range they have the Baja

Top to bottom, three groups of figures from the Airfix OO/HO range, the British Grenadiers, Washington's Army, and a delightful selection of astronauts. Each set is excellent value at 17p, and there is plenty of painting work for those prepared to undertake it.

Airfix's new 1/72 replica of the North American Aviation's RA-5C Vigilante.

Buggy (U.K. price 15½p) which is finished in a bright metallic green, with a flower-power sticker on the bonnet and a chromium plated, V-8 dragster engine at the rear. Also in the superfast range is a Dodge Dragster (U.K. price 15p), finished in fluorescent pink, with the body hinged at the rear, pivoting up to reveal the chromium plated chassis and V-8 engine. No. 64 in the Superfast series is a Slingshot Dragster (U.K. price 15½p) which when compared with photos of a real one, only looks vaguely like it, but will probably appeal to the kiddies.

In the Speed King range Matchbox have an attractive looking camping cruiser and Scammell "Freight Liner". The Camping Cruiser has an opening roof and rear door which reveal the nicely detailed interior, equipped with cupboards and sink unit; this retails at 49p. The "Freight Liner" is also nicely detailed, has sliding side doors, and is finished in metallic turquoise and brown.

The last new item from Matchbox is the Brroomstick (U.K. price 25p) which is a handle with a length of elastic attached to it which is stuck onto the bonnet of a Matchbox Superfast car and by pulling on the hand controller the car leaps into action. It is possible to vary the speed of the car by the degree of pull and hence stretch in the elastic, and to "drive" figure 8s etc. More fun than just pushing the models along.

The new A.S.I. "Paratrooper" repeater air rifle.

Heller have a number of new plastic kits, imported by Riko, four we have seen being the Tupolev Tu 16 Jet Bomber in 1/200 scale and having a 7 in. wing span (U.K. price 20p), the *Fauvette* Steam Yacht in 1/200 scale, 10 in. long (£1.55), the *Lenin* nuclear icebreaker in 1/400 scale, 13 in. long (£2.12) and Program Apollo, which includes the L.E.M. and Mother Ship in 1/100 scale and sells at 80p. All these kits have nicely fitting parts and the detail in moulding is quite good.

A new air rifle from A.S.I. is the Paratrooper repeater which fires waisted pellets. When the gun is cocked it automatically inserts a new pellet in the breech from the magazine, which holds 25 pellets, and the gun is then ready to fire. This version is a development of the original Paratrooper and has a .177 calibre. The price is £17.95 and it can be purchased from most gunsmiths and sports shops throughout the country.

If you are a keen Aeradio listener or want to know how the system works, B.E.A. together with International Aeradio Limited have produced an up to date and complete "Guide to Approach and Landing at Heathrow Airport".

The Guide, which comes in a neat wallet, explains about aircraft stacking, radio beacons, talk-downs, aircraft taxi-ing and parking, together with diagrams on each subject. It also gives the meanings of the words used by the pilots and ground-control men.

Included in the wallet is a leaflet explaining a 'stack', a B.E.A. News Letter, a guide to Approach and Landing at Heathrow Airport, and an Aerad Flight Guide, which gives the arrivals and departures from Heathrow. The main aim of the guide is to make the complicated stages of landing an aircraft much easier to understand.

This wallet is a must for all enthusiasts and can be purchased from Mr. V. Windett, International Aeradio Limited, Hayes Road, Southall, Middlesex, at a cost of 60p including postage and packing.

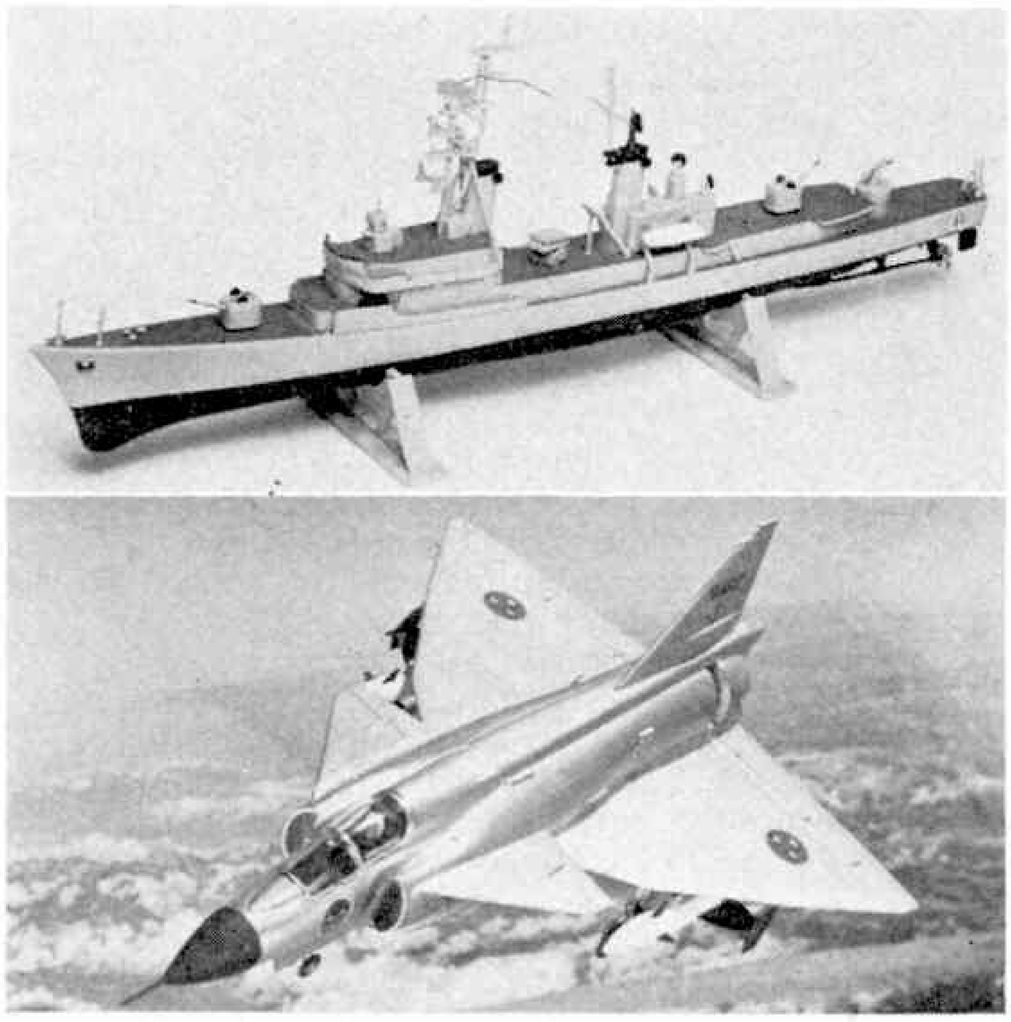
Charbens & Co. Ltd., of 219 Hornsey Road, London N7 6RB, have brought out a new item which will undoubtedly interest football fans. This is a set of footballers moulded in white plastic for painting in your favourite team colours and which can be placed around a cardboard cut-out goal. The set, called Football Favourites, comprises four players in a variety of positions, a colour identification guide for World Cup, international club and major British League teams, a set of paints and a brush, team numbers in black and white, four footballs, a goal and a 12 × 18 in. card base to put the models on. Also included is an order form, from which you can send away for more players, numbers, paints or footballs. The figures, which are moulded in white, softish polystyrene, are roughly 1/18 scale, standing about 4 inches high. The main criticism of this set is the paints, which are gloss and not matt, and the flesh is the wrong colour as it has too much yellow in and makes the players look Chinese. On the other hand the Football Favourites guide is really good, giving all the 1st. 2nd, 3rd and 4th division colours together with the 1st and 2nd Scottish division teams and the colours of the Irish league. Also included are the International teams and 1970 World Cup team colours. The guide also devotes a section to "Football Facts" and "Painting" hints and colour mixing. Price for the whole outfit is £1.50 and additional individual players are 30p each, plus 10p post.

One of the two new releases from Frog is the Grumman F6F-3 Hellcat F. Mk. 1 in 1/72 scale (U.K. price 20p). The kit supplies markings for either the 800th sqn., Fleet Air Arm serving on H.M.S. *Emperor* during the months July and August 1944, or as an aircraft from 1839 sqn., Fleet Air Arm, serving on H.M.S. *Indomitable* in the Indian Ocean during 1944.

On the whole this is a good kit and apart from the canopy and wings, the parts fit together quite nicely.

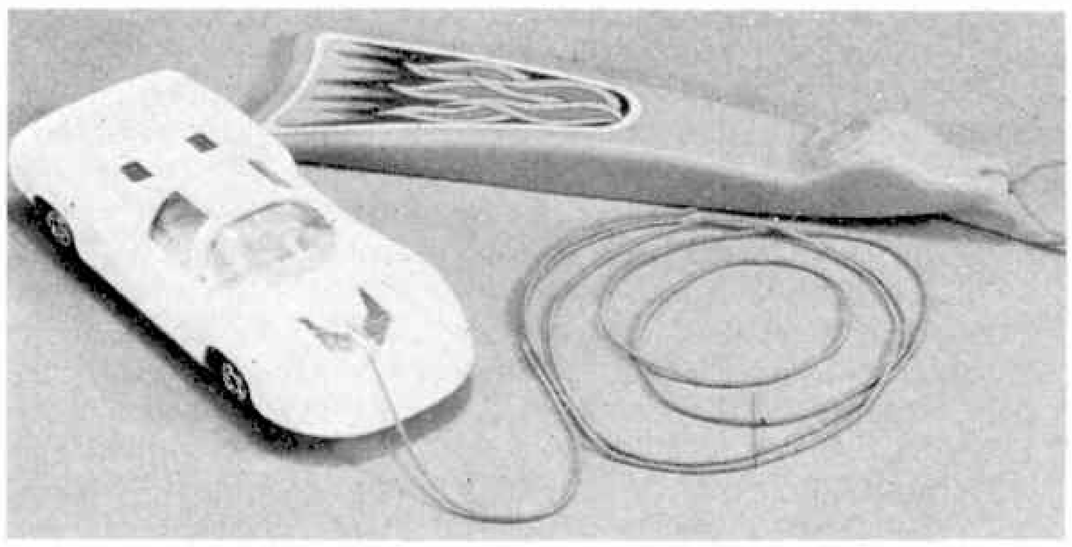
The other new release is the Dornier Do. 17Z-2 (U.K. price 47p). This kit has few faults as regards detail and authenticity, but is rather spoilt by two small details. One, the engine fits rather badly to the wing as does the wing to the fuselage, but with a bit of work with some filler, these could be eliminated. The second point is that there should be a small window either side of the fuselage just under each wing, and on the kit these are just scribed on the plastic. This fault can be put right by drilling a hole where the window should be and then by filing the rest away, up to the scribed lines, with a square needle file and then gluing a piece of clear plastic over the windows from behind. Apart from this, though, it is a very good kit, having a choice of markings either for 1 Gruppe K.G.3, operating in France during September of 1940, or of PLeLV 46 of the Finnish Air Force, 1943. As is usual with Frog, the artwork and transfers on both these kits are excellent.

Almark Publications have just released two new books to their ever increasing range of military information. The first is a 112 page book on the Waffen-SS (U.K. price £1.75), by D. S. V. Fosten and R. J. Marrion. The book is divided into four parts, the first of which explains the establishment, organization and divisions of the Waffen-SS. The second part discusses the uniforms worn by the SS together with drawings and colour plates showing a very wide range of dress. The third section is devoted to the Waffenfarben, which is a very short chapter on the different coloured pipings on the shoulder straps of the NCOs and other ranks. The fourth part shows in great detail the Rank and Unit insignia carried by all the members of the SS. All four chapters are supported by photographs and for anyone interested in German uniforms, Insignia and Equipment from 1938–1945, this book certainly gives excellent coverage.



The second book from Almark Publications would be of particular interest to anyone interested in AFV markings of the British Army. The book, entitled "British Military Markings", covers the 1939–1945 period and the author is Peter Hodges. This book is smaller than the Waffen-SS, having only 64 pages, but still covers a very wide range, being split into six parts. The first explains the military formations and the second gives the formation signs. The third part gives the Arm of Service marks. Part four shows the tactical signs and has colour plates showing the Army and Corps signs, Divisional signs, Armoured Brigades, Infantry Divisions, and Royal Artillery Tactical marks. Parts five and six are devoted to other vehicle marks and a guide to vehicle markings. The paper-back edition of this book can be purchased for £1.25p.

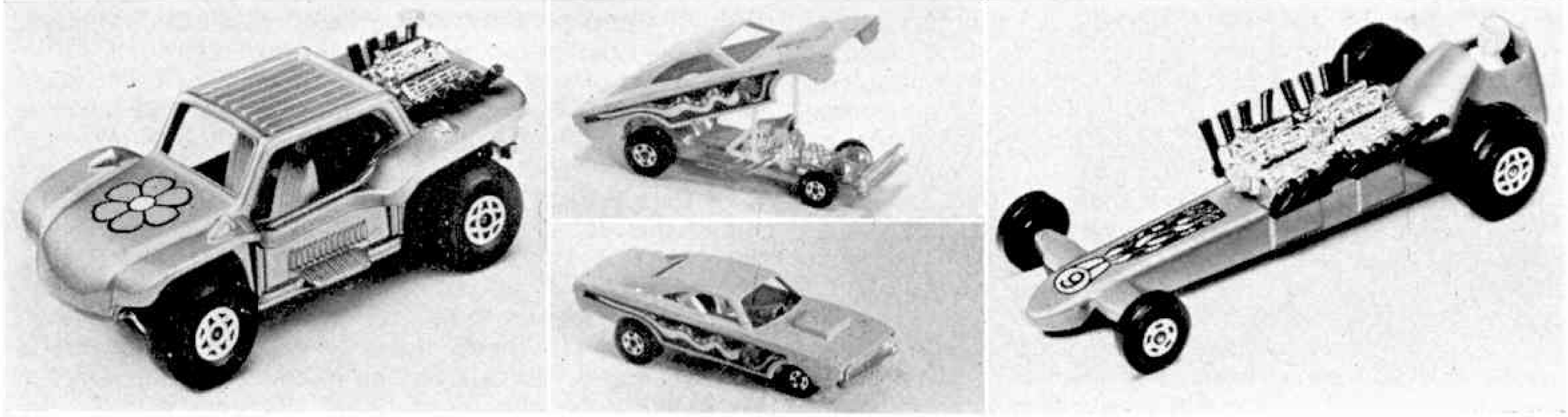
(*continued on page* 608)



Above right: Also from Airfix is the latest 1/600 scale ship, the *Rommel* and below that the Saab Viggen in 1/72 scale.

Above: "Matchbox's" new remote control *Brroomstick*, which comes in the latest way of packing goods, the bubble pack.

Below: New dragster engined cars from "Matchbox". From left to right: the Baja Buggy, the Dodge dragster with its realistic American "Funny Car" hingeing bodywork, and the twin engined Slingshot dragster.



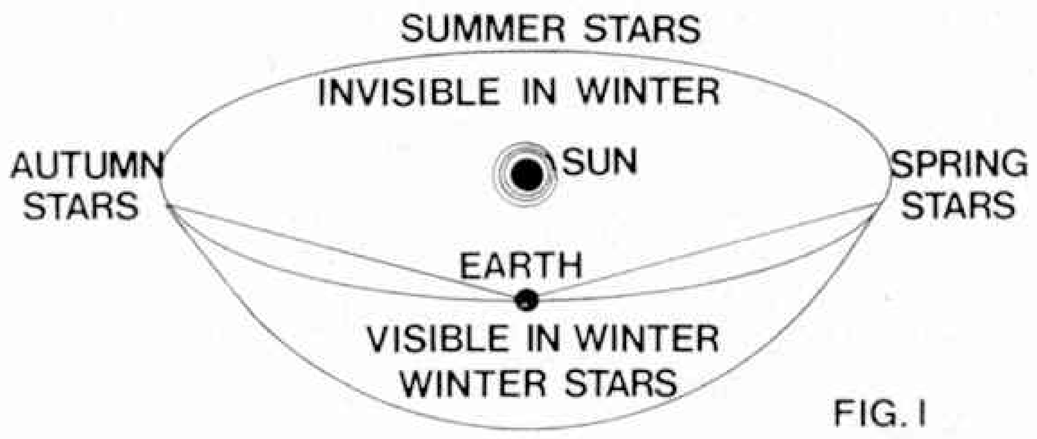


FIG. 1

Signpost to the Stars

R. Westwood invites you to take a good look at the wonders visible on any clear night.

★ ★ ★ ★

OF ALL the beauties of nature, the starry sky is the most impressive. All of man's exploits in space and on the moon are insignificant when viewed on the much wider canvas of the vast universe.

The usual comment made about astronomy is that to understand it one needs a knowledge of mathematics—this is true if you are a professional astronomer, but it is not necessary to be a mathematician to appreciate the beauty of the stars any more than it is necessary to possess a degree in botany to admire the beauty of a flower.

The only qualifications are a clear night, a star chart, warm clothes and a little patience. The reward is the thrill of discovery, for strangely enough it is thrilling to look up an object on a chart and then to be able to locate it in the sky.

One's first glance at the stars is a little discouraging—there are so many! How can one sort them out? However, if we look carefully, we can see that they form patterns and by learning these shapes, or to give them their correct name, 'the constellations', we can find our way around the sky.

Most people are familiar with at least one constellation, the seven bright stars that form the Plough, although strictly speaking it is only part of a much larger group called Ursa Major, or the Great Bear.

The patterns themselves are quite accidental, and viewed from any other position in space, different formations would be seen, but to early man it seemed logical to imagine that the stars represented the gods and heroes of their folklore.

The Greeks' rich culture provided many wonderful stories and many of the characters represented in the sky come from these stories. The constellations divide the sky up so conveniently that even today, in this age of science, we still use them. Although some of the names are a little tongue-twisting, most of them are quite easy to pronounce!

Some of the individual stars are so bright that they have their own names as well as the constellation name. The brightest star in the sky—Sirius—is a case in point; it actually lies in the star-group of Canis Major, or, translated, the Great Dog.

Talking of brightness, a glance at the sky will show that some stars are brighter than others. We call a star's brightness its *magnitude*. This word was first used by one of the early Greek astronomers, and broadly speaking the brightest star is of the first magnitude and the faintest that can be seen with the unaided eye is of the sixth magnitude. The lower the number, the brighter the star; rather like one's position in an examination!

Just as the flowers have seasons, so do the stars. We have different stars in the Spring, Summer, Autumn and Winter. The reason for this is the Earth's motion round the Sun, which causes the stars to creep slowly, night by night, across the sky.

You can easily prove this by sighting a star, and lining it up with some convenient object, for instance a television aerial. Make a mark of your position, by driving a garden stake into the ground so that you can return to exactly the same position. Note the time and return at that time the following night. You will see that the star is no longer lined up with the aerial. To see the star correctly aligned, you would have to be at your position four minutes earlier. The stars gain on our clock four minutes each night, so new ones rise and others set, returning to their same positions in a years' time.

The best time of year to start learning the stars is very definitely the Winter. The nights are long, crowded with bright stars and in the cold frosty air, the stars shine brightly. So, having wrapped up against the cold, shall we look at some of the interesting stars visible in the late evening?

The first thing we must do is to let our eyes become accustomed to the dark, so that we can see the fainter stars. Incidentally, although to see the stars well you need to live away from bright lights, you will still be able to see many of the stars in quite strong street lighting. Indeed, I learnt my way around the sky from a garden in North-West London.

Perhaps the best star-group to begin with is the Plough, as it can be used to find many other stars. You will find it low in the north-east on Winter evenings. Look at the second star in the handle, do you notice anything odd about it? If the sky is clear and your eyes are good, you will see a second, fainter star just above it. If you can't see it, a pair of field glasses or binoculars will show it clearly. The bright star's name is Mizar and the fainter Alcor. To the Arabs Alcor was an eyesight test, for it needed keen eyes to see it, but Alcor must have brightened up, for it is not a really difficult object to see.

Tracing a line through the two 'pointers' of the Plough brings us to the Pole Star, about which the sky appears to turn. This star, named Polaris, is in fact the end of the tail of the Little Bear or Ursa Minor. This poor animal is being swung around the pole suspended by his tail, and in the Winter can be seen hanging upside down above the Plough!

Continuing our line from the pointers we find high overhead a 'W' shape. This is Cassiopeia, the Queen. It must be admitted that the 'W' does not look much like a queen, but in these star-groups, likeness to the actual object is more coincidence than design!

That band of silvery light, the Milky Way, runs through Cassiopeia and a very small pair of field glasses will show many clusters of stars in this region.

A little south-east of Cassiopeia, we come to Perseus, connected in Greek legend to the Queen and another constellation called Andromeda.

The story goes that Cassiopeia boasted that she was fairer than the sea nymphs. This naturally angered the god of the sea, Neptune. He in reply sent a huge sea monster to ravage the coast. Cassiopeia and her husband, King Cepheus, terrified at what was happening, asked a fortune-teller for advice. The reply was very unpleasant: 'chain your only daughter Andromeda to a rock out at sea and let the monster devour her, for this is the only way Neptune will forgive you for the

insult'. The King and Queen did as they were asked, but naturally were very upset.

Meanwhile, the hero Perseus was returning from a very dangerous mission, in which he had to obtain the head of Medusa, a horrible creature who turned to stone all that looked upon her. The gods, however, had helped Perseus and he was successful, the head being carried in a pouch loaned by Hermes, the messenger of the gods.

He arrived in the nick of time: the monster was nearing the coast. He swooped down, pulled the head from the pouch, and the monster was turned to stone!

Of course, in true fairy story style, they fell in love, were married, and lived happily ever after.

Perseus himself forms a great 'Y' of stars, and again field glasses will show lots of pretty clusters of stars.

Andromeda, the other main constellation of the story, is not nearly as attractive in the sky as in legend! A line of three fairly bright stars extending west from Perseus completes this group. But there is one very interesting object, and this is above the middle star. On very clear, moonless nights a faint smudge of light can be seen. It is a little clearer in field glasses, but still faint. This is one of the closest of the *galaxies*, or systems of stars. We and all the stars in the sky live in a similar galaxy, in fact much of the knowledge of our star system was gained from studying the Andromeda galaxy.

Photographs show that it has a catherine-wheel-like shape. This, of course cannot be seen with the eye, only photography is sensitive enough to show detail.

The distance of this object is truly mind-staggering—2.22 million light years! This explains why although it contains more stars than our galaxy, it appears as this faint, misty patch.

Perhaps this is a good place to explain what a light year is. Light travels very fast: in fact it is the olympic gold medallist of the universe and nothing can travel faster than light's 186,000 miles per second. All a light year is, is the distance light travels in a year—nearly six million million miles. So even the very close stars are very distant and the Andromeda galaxy is unbelievably far away. In fact it is the most distant object your unaided eye can see.

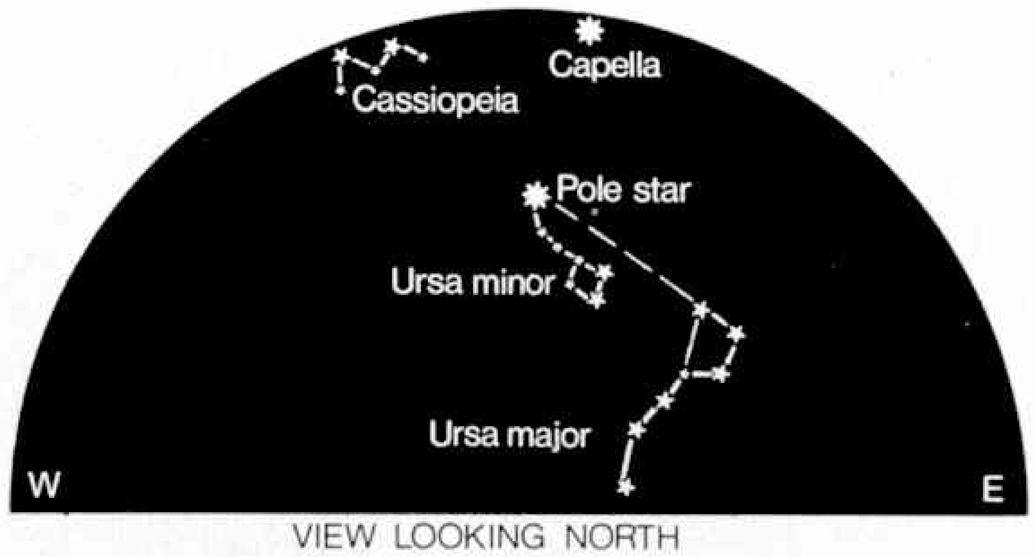
Turning to the south, we will find the showpiece of the sky, the giant Orion. Built of some of the mightiest stars of the sky, he strides across the southern rooftops.

Most people think that all the stars are white, but if you look at the top left-hand star, you will see that it is distinctly red. This star belongs to a class astronomers call 'red giants', and is known as Betelgeuse. It is one of the largest stars known. If we replaced the sun with Betelgeuse, all of the planets out as far as the Earth would be engulfed. Despite this stars' great size it is so far away—like all of the stars—it appears as a mere dot even in the Mount Palomar telescope.

In direct contrast to Betelgeuse, look at the lowest star to the right; this is Rigel, a very luminous blue-white star. The light from this star takes 900 years to reach us. Indeed it is so remote that its distance is difficult to measure but Rigel must be very bright to appear so bright to us.

Looking up from Rigel, we find three fainter stars arranged in a line. This is Orion's Belt: following this to the east leads us to the brightest star in the sky, Sirius, a pure white star. It appears so bright because it is relatively close, only nine light years away.

Going back to the belt of Orion for a moment; if you look down from the centre star you will see a line of stars, and a closer look shows that one of them is 'misty'. This is the famous 'Orion Nebula'. The word 'nebula' is simply Latin for cloud; in this case a huge, tenuous cloud of hydrogen gas, some 1,500 light-years away. A



VIEW LOOKING NORTH

good pair of binoculars should show the brightest part quite well, and also the four tiny stars enmeshed in the gas.

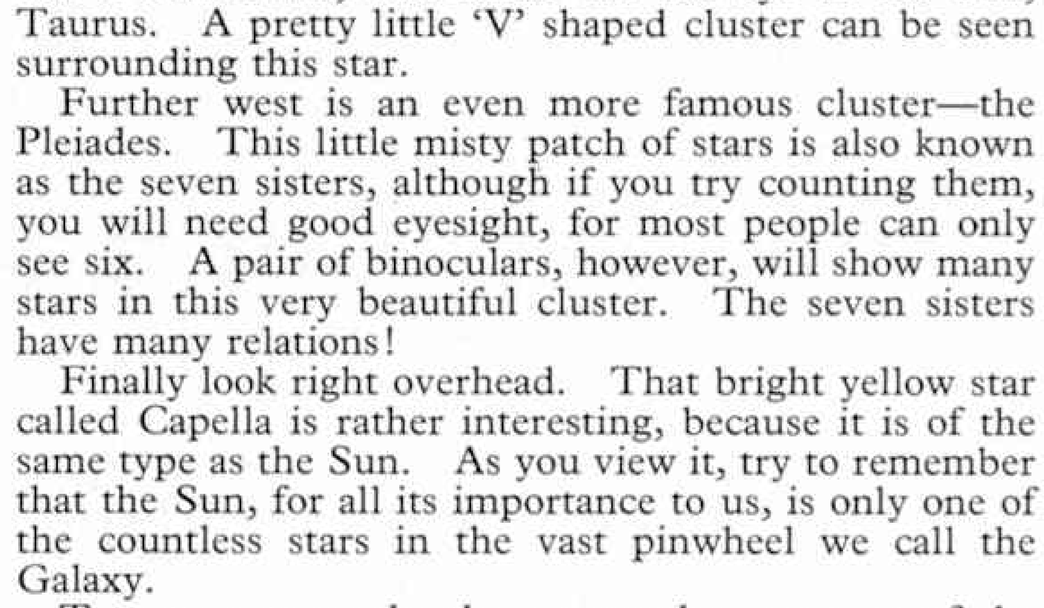
If we take a line from the western-most star in Orion's belt, through Betelgeuse, we find two fairly bright stars high up. They are Castor and Pollux, the two bright stars of Gemini, the twins. The rest of the constellation can then be found, a box-like shape pointing to Orion. Castor, the highest star of the two, is in fact several stars revolving around one another but unfortunately to see this sight one needs a large telescope. There is, however, one object worth looking for, and that is a cluster I have marked on the chart. One famous observer once said "It has the appearance of a bursting sky-rocket, no one can see it without a shout of wonder!" Admittedly he was using a larger telescope, but the area is still very pretty in binoculars.

To the west of Orion we find another red star. This one is Aldebaran, and forms the red eye of the bull, Taurus. A pretty little 'V' shaped cluster can be seen surrounding this star.

Further west is an even more famous cluster—the Pleiades. This little misty patch of stars is also known as the seven sisters, although if you try counting them, you will need good eyesight, for most people can only see six. A pair of binoculars, however, will show many stars in this very beautiful cluster. The seven sisters have many relations!

Finally look right overhead. That bright yellow star called Capella is rather interesting, because it is of the same type as the Sun. As you view it, try to remember that the Sun, for all its importance to us, is only one of the countless stars in the vast pinwheel we call the Galaxy.

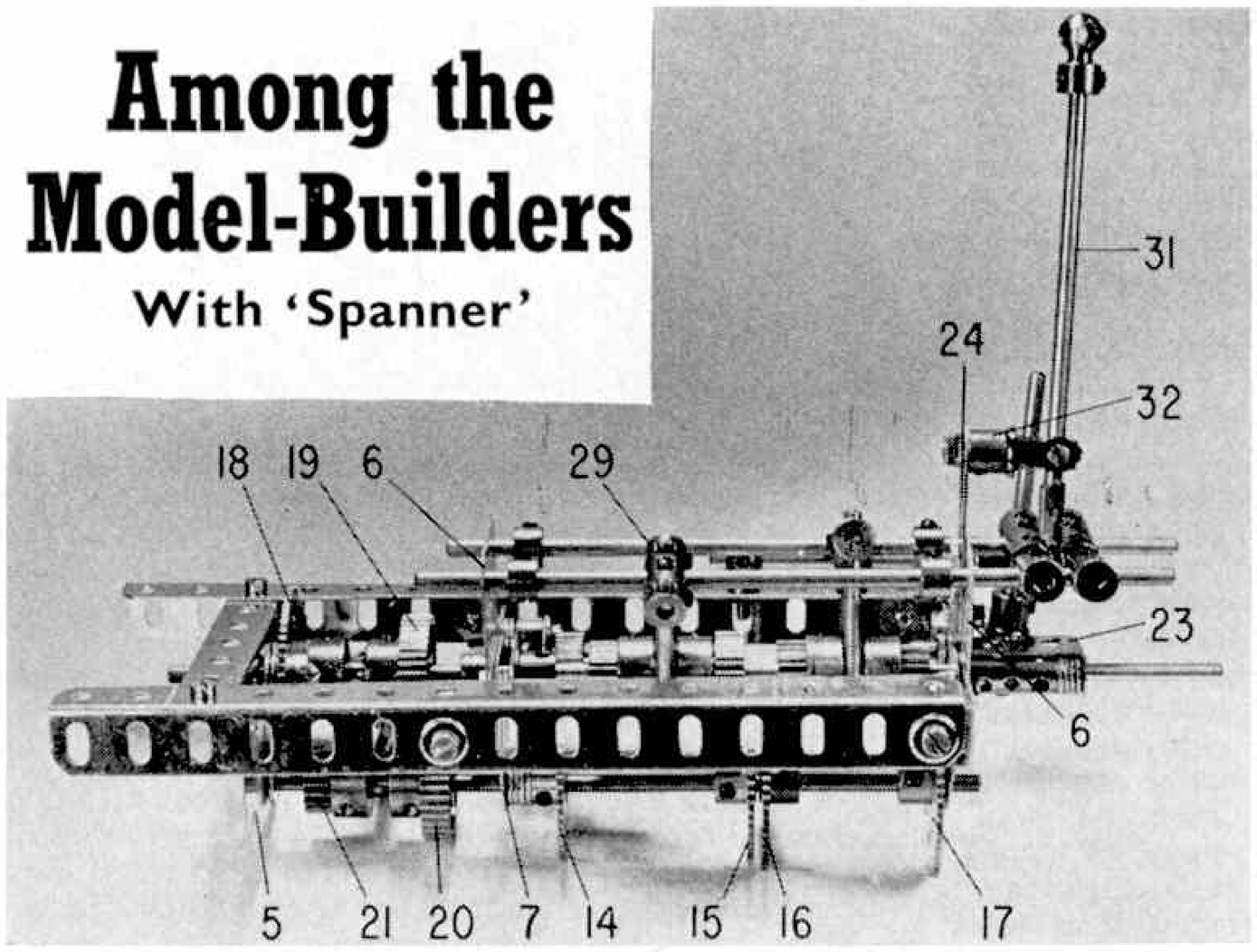
To return to earth: the spectacular treasures of the sky can be enjoyed by all. If you delve deeper you will find many other wonders and your patience will be rewarded the more you search. I have barely scratched the surface in this article and I hope you have as much pleasure finding these sights as I did when I first saw them.



VIEW LOOKING SOUTH

Among the Model-Builders

With 'Spanner'



Full credit for this 8-speed Heavy Vehicle Gearbox goes to Mr William Charleson of Oldham, Lancs.

I AM devoting "Among the Model-builders" this month to two very interesting mechanisms designed by Mr William Charleson of Oldham, Lancs. First in line is an 8-speed Heavy Vehicle Gearbox which Mr Charleson describes as a "heavy-duty type with a high range/low range shift". It gives six forward ratios of 12:1, 9:1, 6:1, 4:1, 3:1 and 2:1, respectively, plus two reverse ratios of 9.3:1 and 3.1:1. As Mr Charleson points out, the unit is in fact two gearboxes in one, the primary section giving one reverse and three forward ratios which are effectively doubled-up by the secondary high/low range section, which gives a choice of two ratios affecting all gears in the primary section.

The unit was designed to fit chassis main frames of $3\frac{1}{2}$ in. width, represented here by two $7\frac{1}{2}$ in. Angle Girders 1, connected together by a $3\frac{1}{2}$ in. Angle Girder 2 and two $3\frac{1}{2} \times \frac{1}{2}$ in. Double Angle Strips 3 and 4. A $3 \times 1\frac{1}{2}$ in. Flat Plate 5 is bolted to the spare flange of Angle Girder 2, while a $1\frac{1}{2} \times 1\frac{1}{2}$ in. Flat Plate 6 and a Flat Trunnion 7 are bolted to each Double Angle Strip. Note that the $\frac{3}{8}$ in. Bolts fixing the Plate and Trunnion to the inner Double Angle Strip also fix a Double Arm Crank 8 in position, this Crank being spaced from the Flat Trunnion by two Washers on the shank of each securing Bolt.

Journalled in the boss of the Double Arm Crank and in the centre hole of Double Angle Strip 4 is the input shaft, supplied by a 4 in. Rod with Keyway. Sliding on this Rod are two Socket Couplings, one carrying a $\frac{1}{2}$ in. Pinion 9 and a $\frac{3}{4}$ in. Pinion 10, and the other carrying a $\frac{1}{2}$ in. Pinion 11 and a $\frac{7}{16}$ in. Pinion 12. Pinions 9 and 11 are fitted with Keyway Bolts engaging in the slot in the Keyway Rod.

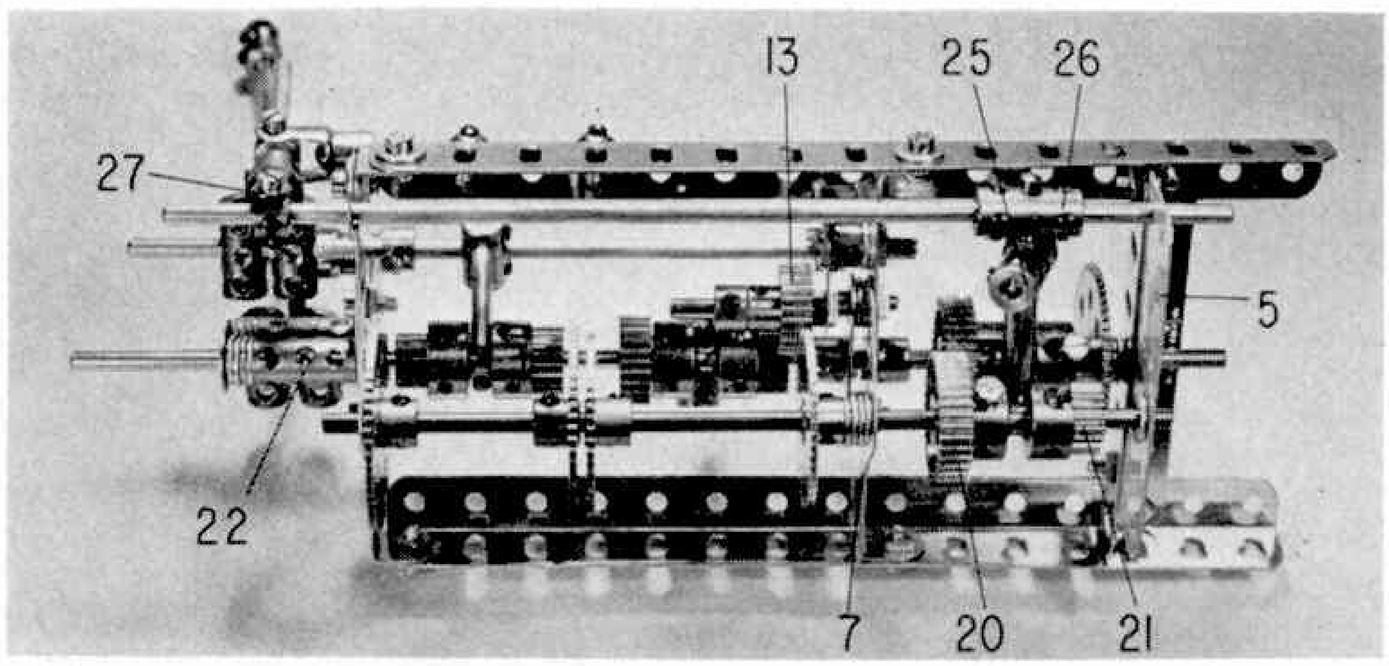
Bolted to Double Angle Strip 3, in the position shown, is a Fishplate, spaced from the Double Angle Strip by two Washers and a Collar. A Long Threaded Pin is secured through the other hole in the Fishplate, a loose $\frac{3}{4}$ in. Pinion 13 being held on this Pin by another Collar to serve as the reverse gear idler Pinion. The Pinion should mesh with Pinion 9 when the relevant Socket Coupling is moved along the Keyway Rod to the appropriate position.

The Gearbox main shaft is a $6\frac{1}{2}$ in. Rod journalled in the apex holes of Flat Trunnions 7 and in the corresponding hole of Flat Plate 5. Mounted on this Rod as parts of the primary gearbox, are a 50-teeth Gear 14, another 50-teeth Gear 15, a 57-teeth Gear 16 and a 60-teeth Gear 17, the first Gear spaced from its Flat Trunnion by four Washers and the last Gear from its Flat Trunnion by one Washer. Gears 14 and 15 mesh, separately, with Pinions 9 and 10, while Gears 16 and 17 mesh with Pinions 11 and 12. Only one Gear and Pinion, of course, must mesh at any one time, therefore sufficient space must be left between Gears 14 and 15 to allow for neutral, the same also applying to Gears 16 and 17.

Moving to the secondary gearbox, a 57-teeth Gear 18 is fixed by an ordinary Bolt on a 3 in. Rod journalled in the centre holes of Angle Girder 2 and Double Angle Strip 3, the Gear being spaced from the Girder by four Washers. Sliding loose on the Rod is a Socket Coupling, in the end furthest from Gear 18 of which a 1 in. Gear Wheel 19 is fixed, the Rod finally being held in place by a Collar. Another 1 in. Gear Wheel 20 is fixed by an ordinary Bolt on the Gearbox main shaft, as shown, while another Socket Coupling, carrying a $\frac{1}{2}$ in. Pinion 21, is mounted loose on the shaft. Pinion 21 meshes with Gear 18, or Gear 19 meshes with Gear 20, depending on the positions of the Socket Couplings.

As the Socket Couplings move on their Rods, the slots in their open ends engage with the ordinary Bolts fixing Gears 18 and 20 to give a dog clutch effect. Positioning of the Gears and Socket Couplings, however, should be such that the upper Socket Coupling carrying Gear 19 is allowed to move through a limited distance only so that the slot in the Coupling never completely disengages the Bolt fixing

A top view of the Gearbox showing the layout of the upper gearing and the gear selector rods.



An underside view of Mr Charleson's Gearbox showing the layout of the gears on the main shaft.

Gear 18. The lower Socket Coupling, on the other hand, must be able to fully disengage the Bolt fixing Gear 20.

The Keyway Rod is now extended outside the gearbox frame by a Coupling 22 and a 1½ in. Rod. This Rod passes through the circular hole in the lug of a 1 × ½ in. Reversed Angle Bracket 23, the other lug of which is bolted, along with a 2 in. Strip 24, to nearby Flat Plate 6. The Coupling is spaced from the Reversed Angle Bracket lug by four Washers.

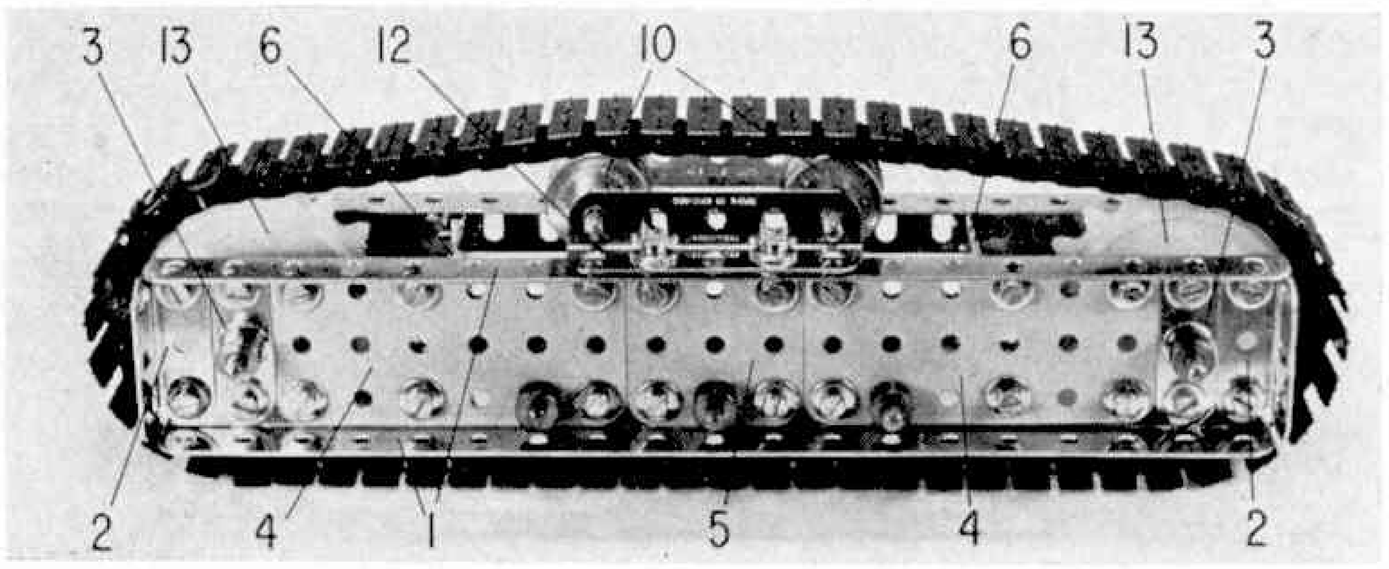
Returning to the secondary gearbox for a moment, the two Socket Couplings in this section are moved as one for gear-changing purposes, the movement actuated by two 1½ in. Rods which engage, one in the waist of each Socket Coupling. The Rods are held in the end transverse bores of a Coupling 25, in the centre tapped bore of which a Threaded Pin is held, this Threaded Pin in turn being fixed by a Grub Screw in the centre smooth bore of another Coupling 26, used to connect a 6½ in. and a 1½ in. Rod journalled in Flat Plate 5 and in a Fishplate journalled to Double Angle Strip 4. An End Bearing 27 fixed on the Rod carries the gear-change lever which pivots in another End Bearing 28, fixed on a 2½ in. Rod secured in two Handrail Supports fixed to nearby Girder 1. Note that the Rod must be free to slide in the "spider" of End Bearing 28.

The two Socket Couplings in the primary gearbox are each controlled by two 1½ in. Rods carried in a Coupling 29, fixed on one or other of two 6½ in. Rods sliding in the corner holes of Flat Plates 6, Collars on the Rods serving as stops to prevent excess movement. Two further Couplings 30 are mounted on each of these Rods, outside the frame, to serve as location points for a Rod and Strip Connector fixed on the lower end of the main gear-change lever 31, supplied by a 4 in. Rod. This Rod is fixed in the spider of an End Bearing 32, locknutted through the upper end hole in Strip 24. When completed, it will be found that this main lever follows a realistic "H" pattern. The following parts list applies to the complete demonstration unit illustrated.

Also designed by Mr Charleson is this Priestman Crawler Track unit which makes use of the new Caterpillar Track Pack, shown centre and right from opposite sides. Note the difference in construction between the two side-frames.

PARTS REQUIRED

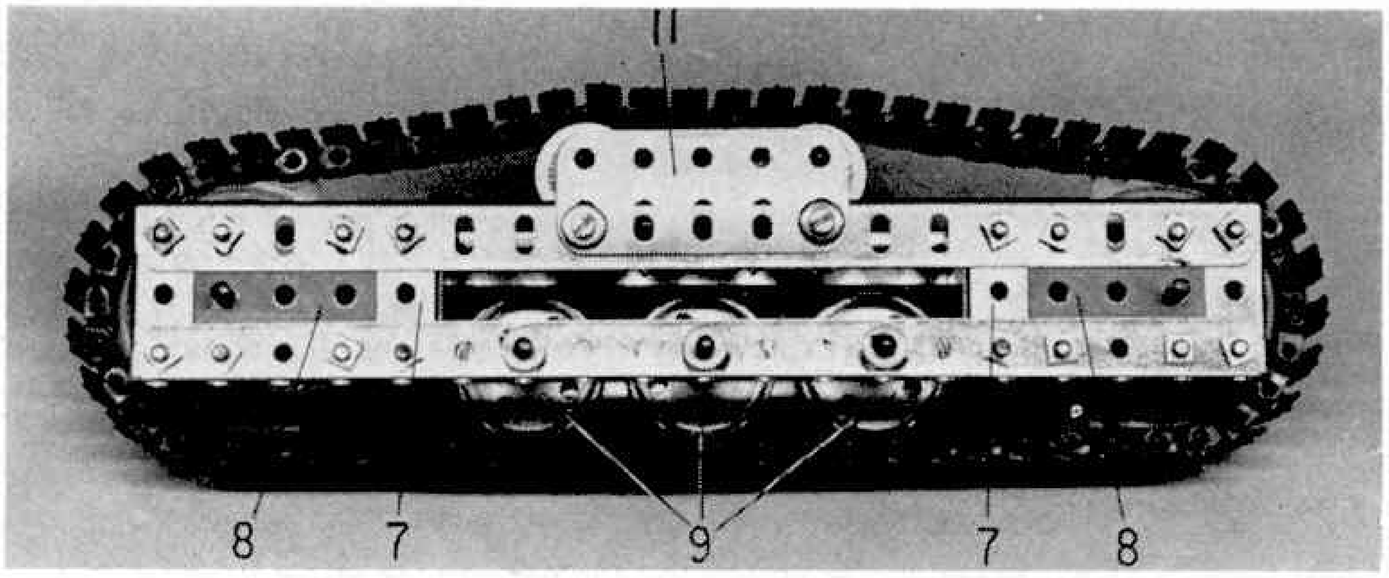
1—6	3—26	2—48b	1—115
2—8b	1—26c	6—59	1—115a
2—10	2—27	1—62b	1—124
4—14	2—27a	8—63	2—126a
1—15b	1—27d	1—73	2—136
2—16a	2—31	2—74	1—136a
1—16b	18—37a	1—111	3—166
7—18a	13—37b	1—111a	4—171
2—25	26—38	2—111c	1—212



Priestman Crawler Track

Mr Charleson's other mechanism is an effective Crawler Track unit of the well-known Priestman type which is particularly interesting here as it makes use of the recently-introduced Meccano Caterpillar Track Pack. Comparatively simple in construction, it is nonetheless sturdy in design and successful in operation. Each side frame is built up from two 9½ in. Angle Girders 1, joined at the ends by two 1½ in. Angle Girders 2, noting from the photographs the directions in which the spare flanges of the Girders are pointing.

Bolted between Girders 1 in one of the frames are two Double Arm Cranks 3, two 3 × 1½ in. Flat Plates 4 and a 1½ × 1½ in. Flat Plate 5, while two further 1½ in. Angle Girders 6 are secured to the back of the frame, one five holes from each end. Two additional 1½ in. Angle Girders 7 are bolted in similar positions between Girders 1 in the other frame, two 1½ × 1½ in. Flat Plates 8 also being bolted between the Girders, as shown, then the two side frames are connected together by two more 1½ × 1½ in.



Flat Plates bolted between Girders 6 and 7.

Three main rollers are next provided by three $1\frac{3}{8}$ in. Flanged Wheels 9, each fixed on a $2\frac{1}{2}$ in. Rod held by Collars in lower Girders 1. Two smaller rollers 10, each built up from two $\frac{3}{4}$ in. Flanged Wheels, are mounted on 2 in. Rods journalled in a $2\frac{1}{2}$ in. Flat Girder 11, bolted to one upper Angle Girder 1, and in a $2\frac{1}{2}$ in. Angle Girder 12, bolted to the other upper Girder 1. Roller height can be adjusted by using the slotted holes in Flat Girder 11 and by packing Angle Girder 12 with Washers.

Journalled in Double Arm Cranks 3 and Flat Plates 8 are the main drive axles, represented on the demonstration unit illustrated by $2\frac{1}{2}$ in. Rods. Fixed on each Rod is a Coupling and a Collar, fitted with small $\frac{7}{64}$ in. Grub Screws, these providing the anchoring point for a Plastic Meccano 20-teeth Sprocket 13 from the Caterpillar Track Pack. When fitting the Sprocket to the Rod, it may be found necessary to temporarily remove the Double Arm Crank to allow the operation to be achieved. The Sprocket is spaced from the Crank and Flat Plate by suitable packing Washers, then finally the track itself is added, using some 62 Track Links.

Again, the following parts list applies to the demonstration unit illustrated, although, in operation, the length of the main drive axles would depend on the parent model.

PARTS REQUIRED

4—8a	3—20	8—59	5—74
1—9d	2—20b	2—62b	1—103f
8—9f	52—37a	2—63	2—P83
5—16a	52—37b	4—69c	62—P91
2—17	44—38	2—73	

SELECT YOUR FILM (*continued from page* 595)

3. In circumstances where you cannot get near enough to take a close up reading of a subject, use some nearby substance of similar tone or the palm of one's own hand.

An exposure technique that is attaining popularity is the "GREY CARD" method of exposure measurement. This is invaluable in obtaining a reflected light reading under unusual conditions, and consists of a non reflective grey card which is held so that it faces midway between the camera and light source. A reading taken from such a card will give an exposure reading that gives correctly toned values for the scene in front of the camera.

In conditions of poor light, when the meter may not be sensitive enough to read from the grey card, a white card can be used and the exposure as indicated by this multiplied by five times.

Such cards can be obtained through any photographic dealer, being produced by Messrs. Kodak as Neutral Test Cards—they give the required grey on one side and white on the other. Such a card is a more than useful accessory in any gadget bag.

Care with exposure more than repays in the final print, and if it is remembered that incident light readings give better results for flesh tones and under conditions of uneven lighting, but that under normal conditions, reflected light readings are adequate, providing the meter is correctly held for landscapes, better photography will follow automatically.

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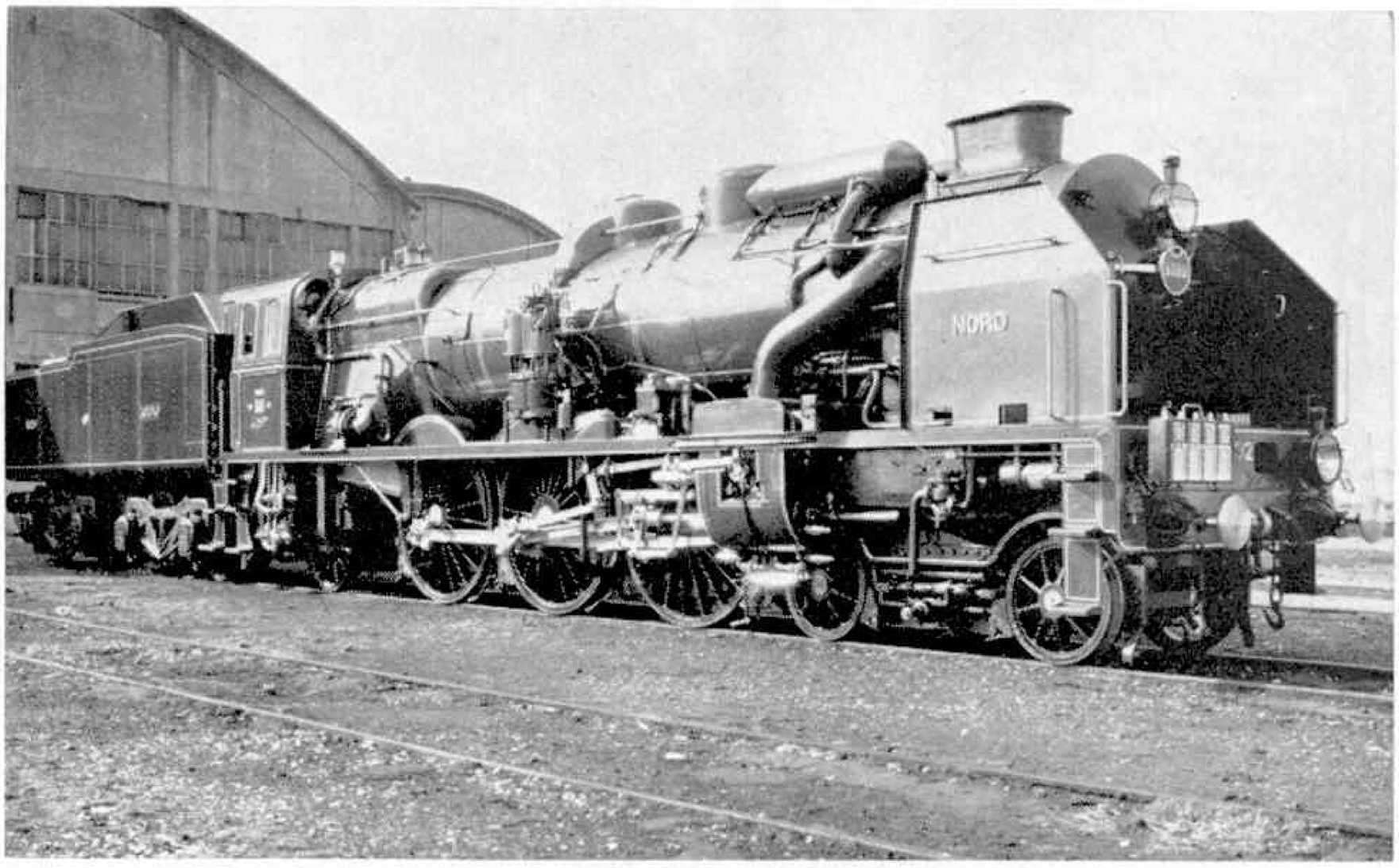
Ever thought how nice it would be to cast the small parts which crop up on nearly every model you build? Colin Binnie tells you about the various methods of casting you can do at home. Quite apart from the time these methods will save, casting provides new scope for railway modellers.

Loco building, making trees and the first of a series of features about mass producing colour light signals are included in the Christmas number of

Model Railways
—the magazine for builders and buyers.



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There will be cash prizes for the best models every three months, both senior and junior and finally the best modeller overall at the end of the year will be awarded a further cash prize of £250 and the handsome Bic championship trophy.

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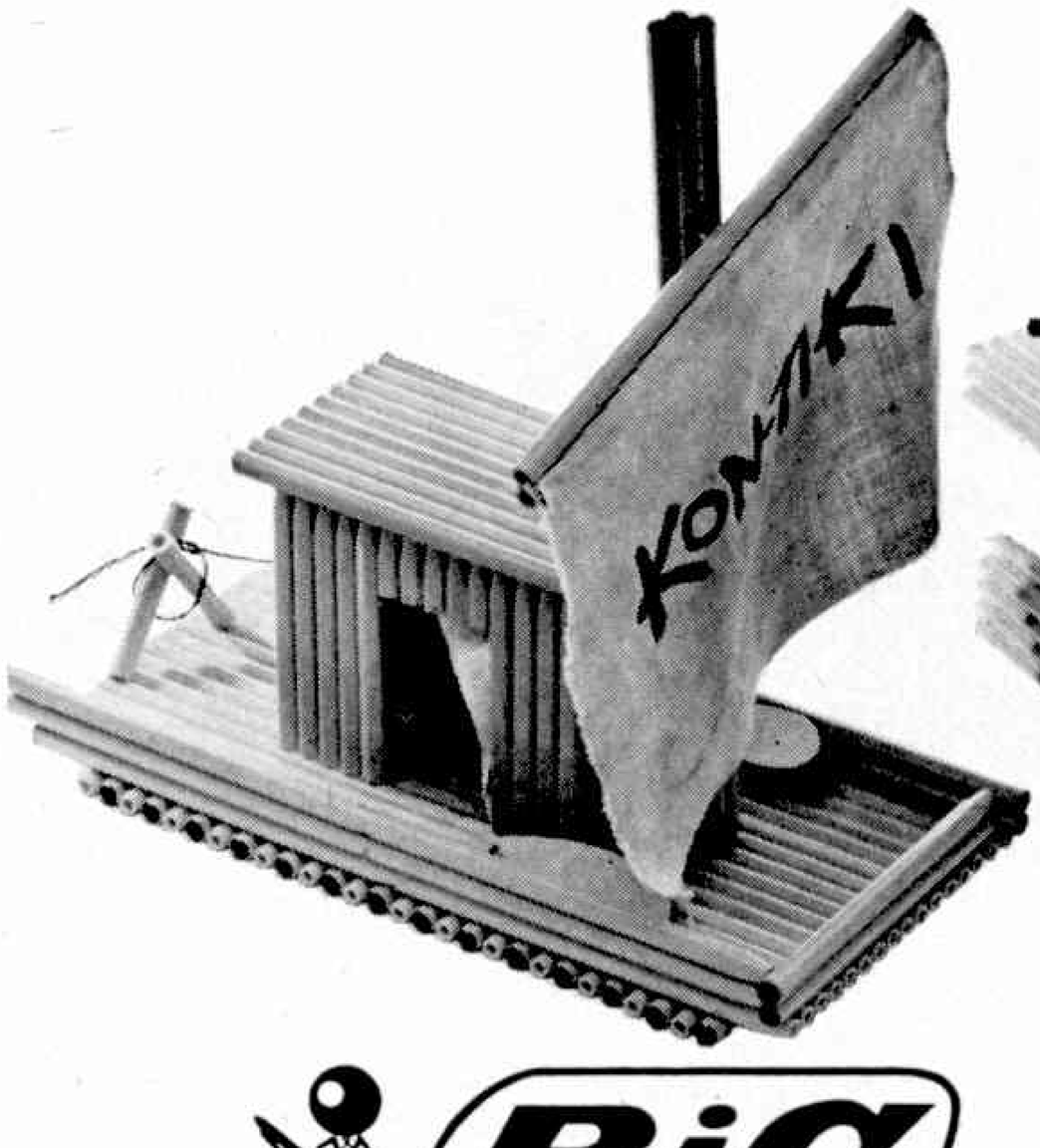

BiC Regd. Trade Mark

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BiC
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Model Making Competition

Start collecting your pens now but—
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RULES

1 The participants of the Bic Model Making Competition will be judged on their originality and technical model-making expertise.

2 The competition will be divided into two parts:
Junior: Participants, either sex, under the age of 16 at time of entry. Within this group no heat or flame technique for moulding may be used, but any other form of adhesion may be utilized.
Senior: Participants, either sex, over 16. Within this group, any form of adhesion is accepted. Heat to bend or shape the pens may be used.

3 Entries for the competition must be accompanied by the official entry form below.

4 Any number of BIC Ballpen barrels may be used. All models must be constructed utilising any part of BIC Crystal Fine (Yellow) and Medium (Transparent) ballpens.

5 BIC Crystal barrels may be cut to shape or size, but each barrel must clearly show the Registered trade name BIC (as imprinted on the barrel). Where models are moulded by heat, there must be at least 10 parts where the BIC Registered trade mark is clearly shown.

6 Accessories other than BIC parts may be used *only* to make the model functional or to infer final design, i.e., wheels, transfers, cotton, string, paper, etc.

PRIZES

7 Prizes will be awarded to competitors who, in the opinion of the panel of judges, produce the most creative, unusual or skilful entry for each quarterly competition.

8 **Quarterly prizes will be awarded as follows:**
Senior section—first prize £25.
second prize £15.
third prize £10.
10 consolation prizes of £5 each.
Junior section—first prize £15.
second prize £10.
third prize £5.
10 consolation prizes of £2 each.

9 Models winning any of the three prizes in either Junior or Senior levels of any of the quarterly competitions will automatically be entered in the BIC National Championship Competition and the individual competitor whose model is selected by the judges to be of greatest merit will receive an additional cash prize of £250 together with the 1971 BIC Model-Making Trophy.

10 **Entrants should send their models to:**
The BIC Model-Making Competition,
c/o Montague House, 23 Woodside Road,
Amersham, Bucks.
Should a model be considered delicate for conventional postage, then a photograph (colour or black and white) may be despatched beforehand. This will be used for preliminary judgement. Entry forms should be clearly attached to each model or photograph entered.

11 No responsibility can be taken for the damage in transportation of any model received. Judges will, however, take into account such unfortunate circumstances and the model will still be eligible for participation within the contest.

12 Should participants require a model returned, then return postage must be included by way of enclosing the appropriate stamps.

RESULTS

13 The 1971 competition will be held during 3-monthly periods and results will be announced during August 1971, November 1971, February 1972.

14 Participants should ensure that their models are despatched to arrive by 1st June (for August judging), 1st September (for November judging) and 1st December (for February judging).

15 Any model received after this date will not be eligible for the relevant Quarter but will qualify for the next Quarter's competition.

16 Any prize winning model will become the property of Biro-Bic Ltd., and may be used in any way they think fit.

17 Employees, relatives or direct associates of Biro-Bic Ltd., Model and Allied Publications Ltd., as well as their advertising agents will not be eligible for this competition.

18 The decision of the Judges is final and no correspondence can be entered into in relation to prizes awarded or decisions made.

I understand and abide by the Rules

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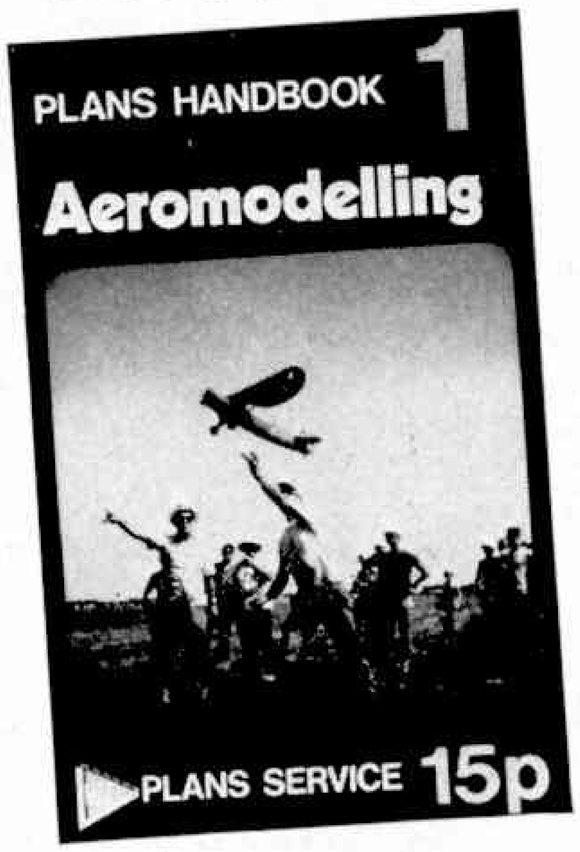

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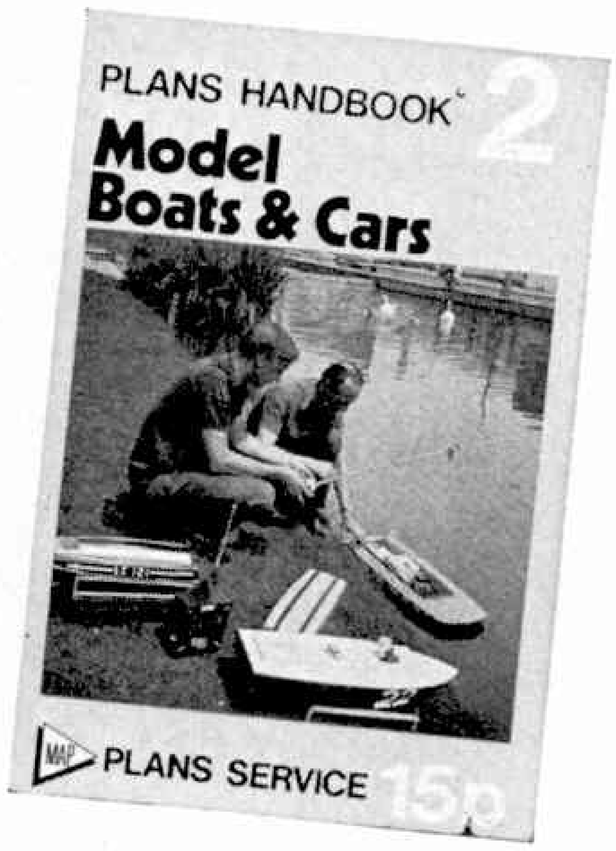

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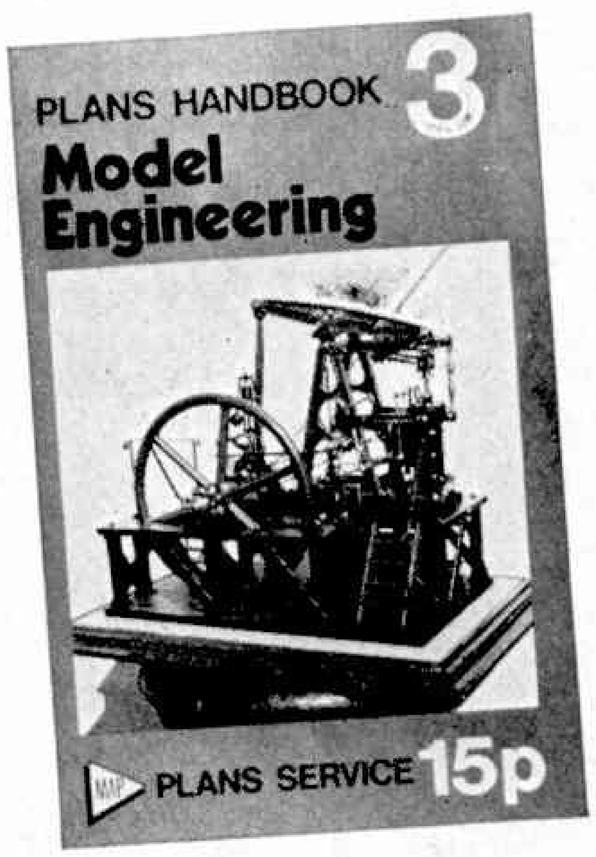

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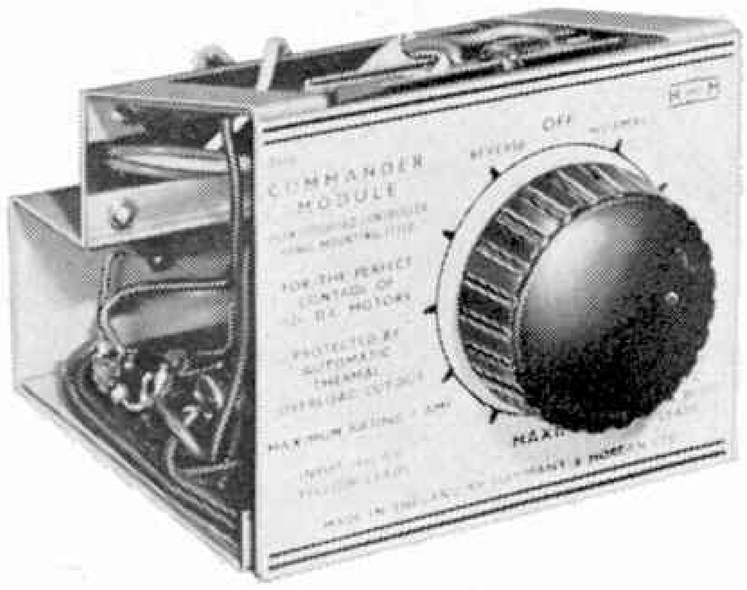

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An introductory article on a new major series on scale ship modelling, a photofeature on the Championships, mostly scale subjects, and Japanese heavy cruiser drawings will interest scale builders, while there is an article on shortening sail which period ship builders, static or working, will find helpful. Yachtsmen have the 10-rater Championships and the penultimate article in the yacht construction series, and there are regatta reports, M.P.B.A. notes, and readers' letters etc.

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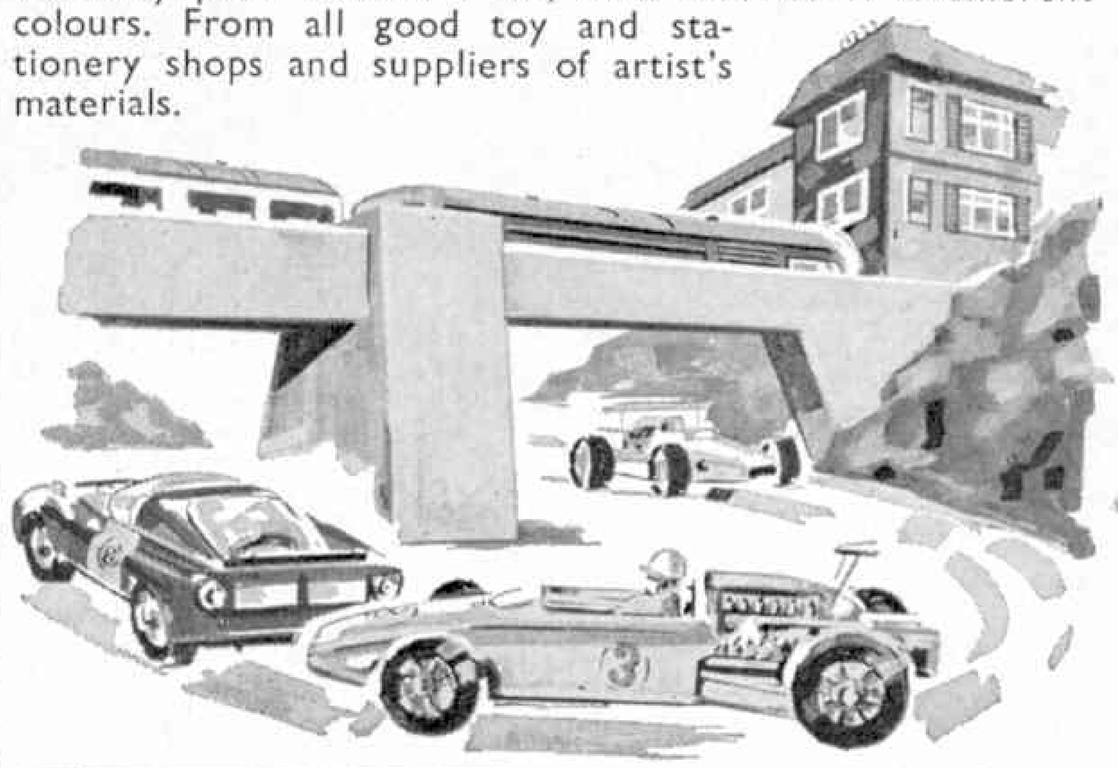

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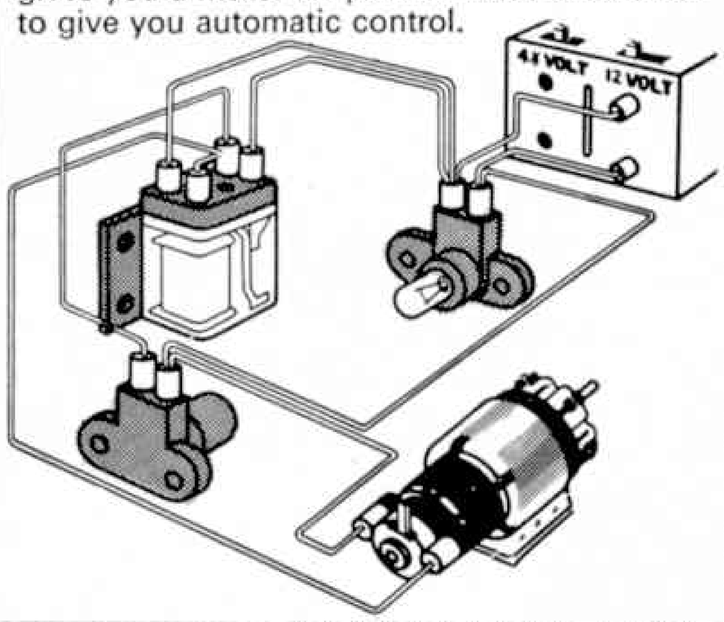

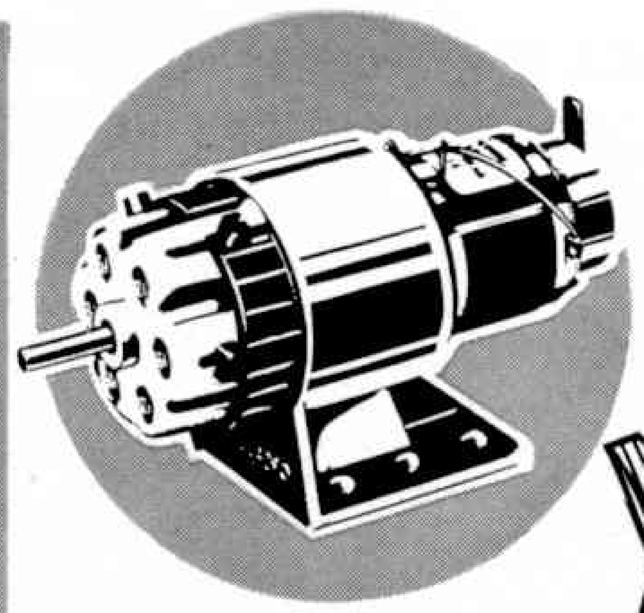

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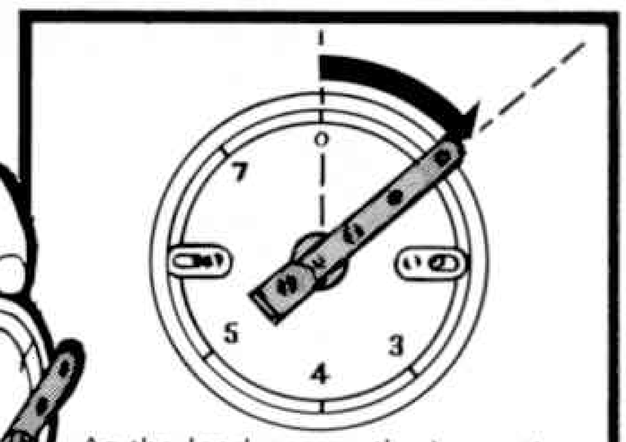

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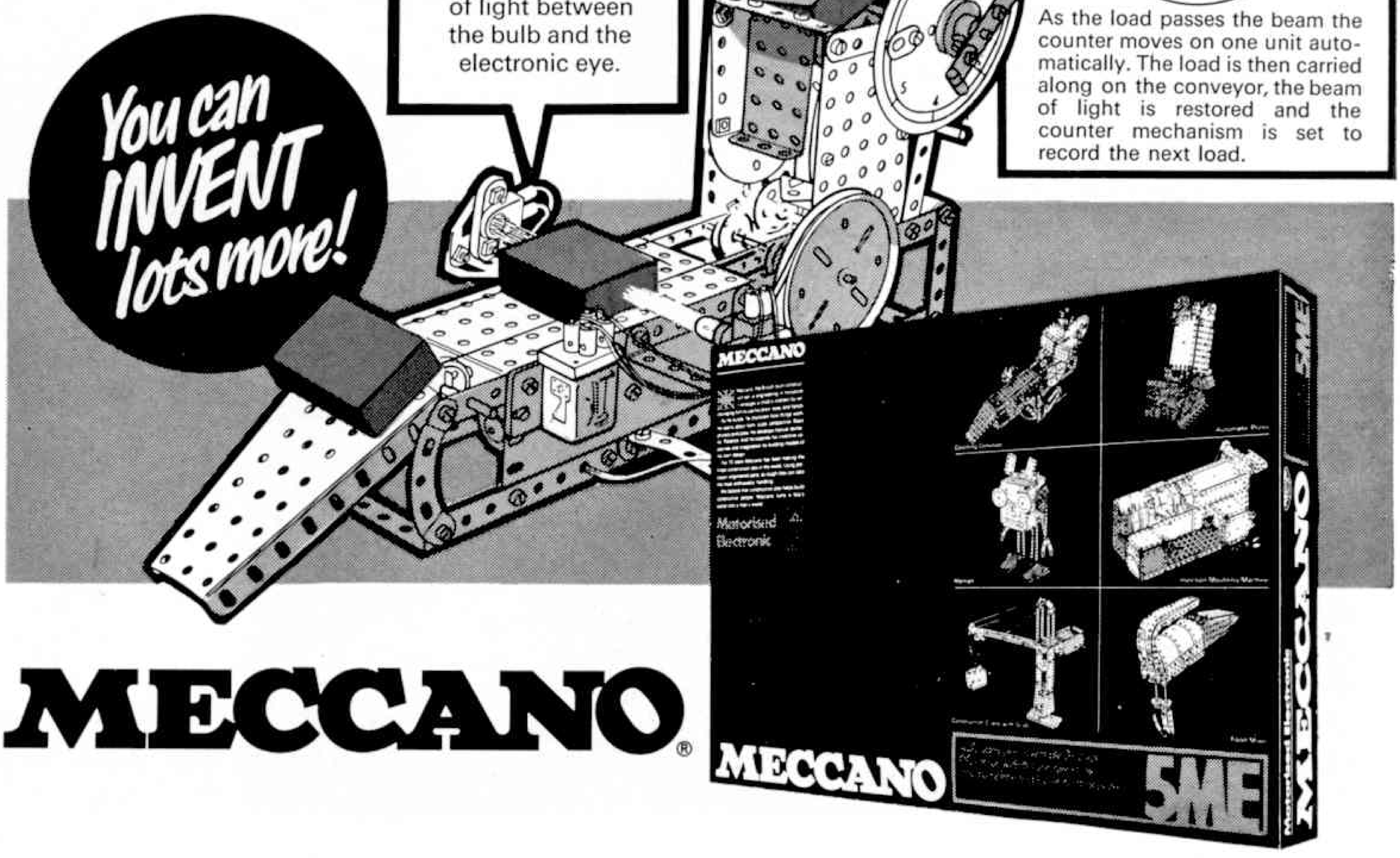

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